

THE CONQUEST
OF THE SOUTH POLE

BY THE SAME AUTHOR

ANTARCTICA, A TREATISE

ROBERT EDWIN PEARY

INSTITUTIONAL CHRISTIANITY IN ENGLAND



By courtesy of H. G. PONTING]

THE RAMPARTS OF THE SOUTH POLE

THE CONQUEST OF THE SOUTH POLE

ANTARCTIC EXPLORATION

1906—1931

By

J. GORDON HAYES, M.A.



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INTRODUCTION

THE author of this book has asked me to explain its origin, scope and purpose. I am glad to do this as I consider the work he has done to be both sound and seasonable. It carries on the record of exploration in the far south down to the present day, and enables those who may be attracted by the next things to be done in the Antarctic to understand the full bearings of the discoveries to come. The origin of the book involves a retrospect, and I apologize for any undue emphasis on the part which it has been my privilege to play in the events to be noted.

When public interest began to return to the Antarctic Regions in the last years of the nineteenth century a coherent narrative of exploration in the far south was produced by Dr. Karl Fricker whose "Antarktis" was published in Germany in 1898, followed by an English translation in 1900. At this time Sir John Keltie was planning his "Story of Exploration Series" in which he linked the progress of discovery in various large areas with the life story of the men who had taken the greatest forward strides. In the original prospectus the subject of "Ross and the Antarctic" was assigned to Mr. Halford J. Mackinder whose brilliant work at Oxford and Reading roused the expectation of a masterpiece. But Sir Halford Mackinder was by then turning from theoretical studies to the more strenuous application of geographical principles to practical politics, and, as he could not find time to proceed with the book, I was called upon to undertake its compilation.

The Antarctic Regions had held a fascination for me since, as a boy, I had read Ross's "Voyage of Discovery and Research" and Jules Verne's "Twenty Thousand Leagues under the Sea," and had gazed at that weird piece of taxidermy, Weddell's type specimen of the seal which bears his name, in the Natural History Museum at Edinburgh. My first duty when I was appointed Librarian of the Royal Geographical Society in 1892 had been to find and instruct naturalists to accompany the Dundee whaling venture to the Weddell Sea which started in that year with my young college friend W. S. Bruce on board the *Balaena*. Later, as Secretary of the Sixth International Geographical Congress in

1895, I had to find room in an overcrowded programme for Carstens Borchgrevink's stirring story of the cruise of the Norwegian whaler *Antarctic* to the Ross Sea. The speakers on that memorable occasion included Sir Joseph Hooker who had sailed with Ross in the *Erebus*, Sir John Murray of the *Challenger*, Dr. Georg Neumayer, the first who tried in Australia and Germany to reawaken the spirit of Antarctic discovery, and Sir Clements Markham whose enthusiasm had just swung round from the North to the South Polar Regions.

The Congress passed a resolution in favour of the renewal of Antarctic exploration and this led to the bold ventures of Gerlache in the *Belgica* and of Borchgrevink in the *Southern Cross*. Before the nineteenth century closed farthest south records had been attained both in the Bellingshausen Sea and in the Ross Sea areas. I was closely concerned in the plans of these and of all the subsequent expeditions to the southern Polar Regions. All the leaders and most of the scientific members of the various British, French, German, Swedish and Norwegian expeditions have been my friends and I have followed their efforts with a sympathy strengthened by close knowledge of the aims which animated them and of the difficulties which they had to encounter.

When in 1902 I undertook to write "Ross and the Antarctic" for the Story of Exploration Series then being published by Lawrence & Bullen, I also began seriously to collect books relating to the Antarctic Regions. I was at that time able to do work outside my duties as Director of the British Rainfall Organization only during holidays and odd half-hours, so it was not until 1905 that the work was finished. I had found it necessary to go fully into the early explorations before Ross, the records of which were scattered and not easily accessible, and also into the later expeditions of the opening twentieth century, the full results of which were still unpublished and the essential facts were communicated to me by the explorers themselves. So it appeared that the book required a more comprehensive title than "Ross and the Antarctic," and Sir John Keltie happily suggested "The Siege of the South Pole." In the summer of 1905 I passed all proofs for press and handed them to Messrs. Lawrence & Bullen before leaving for a visit to South Africa. When I returned three months later I found the book published; but the series had been taken over by the firm of Alston Rivers whose name appeared on the title-page. As I had sold the copyright the business arrangements did not concern

me ; but when some years later the firm of Alston Rivers was dissolved I repurchased the copyright in order that I might control the future of the book, which had been well received, and I was assured by many friends that a new edition would be looked for. It was in fact asked for by the geographical departments of several universities, by the staffs of successive polar expeditions and by geographers in more countries than one.

Meanwhile I had been able to learn much about the expeditions of the twentieth century from records previously kept as confidential, and from men who had superintended the equipment and refitting of the ships in their last ports of departure, as well as from members of all the expeditions, each with views of his own. I had visited almost all the "jumping-off" places in the South, Wellington, Lyttleton, Port Chalmers, Half-Moon Bay, Hobart, Capetown, Punta Arenas, Port Stanley, Buenos Aires and Monte Video, and all this showed that much I had written stood in need of correction.

I accordingly planned a comprehensive revision, resolving to cut down the earlier chapters, to rewrite the accounts of some expeditions regarding which more information had become available, to correct the errors which had been pointed out by reviewers and to carry on the narrative to date. By this time the breakdown of my eyes had made literary work a very exacting labour, but with the help of my wife, who had always been a collaborator in all that I did, I was confident that it could be done effectively and in a reasonable time. But I was not inclined to spend the last of my strength on a book that might never see the light, nor did I wish to publish at my own expense. I felt that if the book in a revised form was wanted one of the well-known publishers of solid literature would recognize the fact and find his own interests compatible with publishing it. One after another the leading firms were approached and courteously expressed the opinion that there was no adequate demand. The most favourable replies were that if the work were completed and placed before the firms they would obtain an opinion upon it ; but I shrank from spending many months of toil for such a slender hope. Then in response to a very urgent appeal I devoted a year to writing the "Life of Sir Ernest Shackleton." This involved a minute study of the voyages of the *Discovery*, the *Nimrod*, the *Endurance*, the *Aurora* and the *Quest*, and of the personality of the most attractive and many-sided man I ever knew. Later, in response to the wishes

of the Council, I gave two years to the preparation of "The Record of the Royal Geographical Society 1830-1930." Here also I had to deal with the origin and management of the National Antarctic Expedition of 1901-3, from a fresh point of view. I felt that these two works must complete my contribution to polar literature.

But the demand for a new edition of the "Siege of the South Pole" arose again from students of geography. The Rev. Gordon Hayes, who had already tackled some of the thorniest controversies regarding the Polar Regions, offered to collaborate with me in producing either a new edition of the "Siege" or a supplementary volume dealing with expeditions subsequent to 1905. Nothing could be more flattering to my old ambitions; but after consideration I declined the proposal.

Work of this kind, I felt, should reflect the unfettered views of the writer, and on some points of opinion and presentation I knew that my friend and I would differ. He generously offered to defer to me in case of any divergence, but if I accepted I knew that it would cripple him in his work. Moreover, a book which was statedly a revision or a sequel would lack the freshness of appeal which alone could attract new readers.

For these reasons I persuaded him to assume the full responsibilities of authorship, to write an original book in his own way, having no connection with the "Siege of the South Pole" except that it dealt with later expeditions to the same regions. Thus the two books would neither overlap nor interlock, but stand as companion volumes expressing the separate individualities of the authors.

I readily agreed to do for Mr. Hayes what I had done for Shackleton, Mawson and Joyce, that is to read the whole book before it went to the printers, to criticize it with the utmost frankness and to leave the author free to adopt or ignore my comments. This arrangement has been carried out and that is the origin of "The Conquest of the South Pole," a happy title if it does not suggest that all was over but the shouting when the Pole itself had been reached.

In scope and purpose the book as it now appears is a contribution to the history of exploration in the twentieth century. Mr. Gordon Hayes has made use of many unpublished records as well as of the authorized narratives of leaders, the publications of subordinate members and the personal help of many of those

who took part in the various expeditions. In his previous book "Antarctica" he made a critical examination of official records through which he often succeeded in penetrating to the heart of truth; though sometimes in my opinion he failed to make all allowances which personal friendship with the explorers themselves might have suggested. Having given free expression to his critical opinion in his earlier book, he now approaches the subject as an impartial narrator of facts. In trying to help him I have been careful not to hamper the expression of his considered judgments of events even when they differ from my own. I know that in order to write a living book an author must be free to follow his natural enthusiasms restrained only by the current standards of good taste. I believe that he has succeeded in this and that "The Conquest of the South Pole" may be taken with confidence as a plain and honest record of the work of the explorers of the present century, written in a style consonant with the spirit of the age.

Now, having guarded myself against any possible charge of undue laudation of the author, I feel free to express my satisfaction with the book. It gives a well-proportioned account of all the expeditions which have entered the Antarctic Regions on exploration and research since the return of the National Expedition in 1904.

Recent exploration differs in one particular from that in the earlier period and the difference is fundamental. Until 1905 most of the great exploring expeditions and many of the minor voyages of discovery were planned by learned societies or government departments or enlightened ship-owners, and the leader was in each case appointed by some authority at home and told where to go and what to try to do. The leader, so selected, in no case proved unworthy of his calling and often came to devote himself wholeheartedly to the region to which he had been sent. Thus Cook, Bellingshausen, Wilkes, D'Urville, Ross, Nares in the *Challenger*, Scott in the *Discovery*, Drygalski in the *Gauss* were set their tasks and executed their commissions. So it was on a lesser scale with Bransfield, Biscoe, Kemp and Balleny. Thus most of the unveiling of the Antarctic Regions before 1905 was carried out under orders. There were exceptions even in the early days, for Weddell in his own ship explored as much for the love of it as in the hope of finding new sealing grounds.

Later, Gerlache, Borchgrevink, Bruce and Charcot each on his own initiative took the first steps in establishing the form of

C.S.P.

organization which has become universal in the twentieth century. In each case a man fired by the desire to make a name for himself by daring exploration or scientific research planned an expedition for himself to lead, and then sought until he found the funds necessary to carry it out. To this class belong almost all the explorers whose adventures are recorded in this volume. Their deeds, as Mr. Gordon Hayes narrates them, show that splendid results have been obtained. But it is plain to see that much more must have been done if the leader could have set out with his own plans perfected by quiet study, with equipment selected and tested at leisure and with a mind free from anxiety as to how it could be paid for. As events have proved every leader went on board his ship exhausted by the uncongenial labour of begging money from rich men whose enthusiasm was slow to kindle or from learned societies with little to give and many rival applications to consider, and in the last resort from newspapers, even though this involved hampering restrictions.

The wonder is that tired men with nerves on edge from their desperate efforts in a financial struggle for which they had no training could rise to the heights of calm courage and endurance which the following chapters record. That some fell by the way need excite no surprise.

The purpose of a book of this kind is not only to set out the records of the past; but also to supply material for guiding enterprises of a similar kind in the future. I have commended the work as a piece of honest and attractive history and I may perhaps indicate how I see the future in its light. Here I must make it clear that I express my own views which may or may not be shared by the author. Some persons take a morbid pleasure in reading of hardship and disaster, and unhappily such tastes are too often gratified by the annals of Antarctic expeditions. This need not be so in the future. Such sufferings and disasters are not a necessary condition of polar travel. Even the most severe cold cannot harm a healthy well-fed man in the prime of his life. The means of avoiding scurvy, mental depression and all the other enemies of health are now well known. All that is required in the way of external aid is adequate transport to bring along a sufficiency of food, fuel, and camping equipment.

The inland journeys described in these pages show plainly that marching on foot, hauling heavy sledges at high altitudes with insufficient food is the worst possible way of covering long

distances in the Polar Regions. It ought never to be attempted again. The use of ponies or mules in the Antarctic may be practicable on a few routes already known; but it is not to be advised for exploring the unknown. Dog teams give much better results, but only with practised drivers. To my mind all experience points to the use of mechanical transport in future, and the most promising kinds appear to be air-tractor sledges and aeroplanes. The pioneer work of Wilkins and Byrd shows that, given a base which is safe for taking-off and for landing, photographic surveyors should find no great difficulty in mapping the whole of Antarctica in a few years. But when the mapping is complete much will still remain to be done by surface parties studying the geology, glaciology and such biological phenomena as may be found. Ground parties should be conveyed to the scene of their investigations by air and kept in touch with the main base by wireless telephones and aeroplanes.

The exploration of Antarctica presents itself to me as a challenge to human intelligence rather than to physical strength. It would be easy for a body like the Scott Polar Research Institute at Cambridge to draw up the plan of an expedition which under the guidance of an experienced enthusiast (several such men are in sight at the present time) should achieve solid results without suffering hardship. But it is absolutely essential that adequate financial support is forthcoming in advance and without hampering conditions. The want of money is the root of all evil in polar research.

Very soon the need for exploring expeditions will disappear as the map of the world grows complete; but for ages to come the sciences of meteorology and terrestrial magnetism will demand continuous observations at fixed stations and over long periods in the Polar Regions, south and north, and there will be no lack of able young men to take advantage of opportunities which intelligence amongst men of wealth can provide. Whether there is any economic value in the Antarctic lands there is not as yet evidence to show. The Antarctic seas have already made many fortunes, and it is pleasing to know that one of the whaling magnates in Norway has devoted large sums of money to the creation of a great polar museum and to the encouragement of research in the Antarctic Regions. May one venture to hope that this book may possibly light some British emulator to like endeavours?

March, 1932.

HUGH ROBERT MILL.

PREFACE

SINCE the publication of Dr. H. R. Mill's "Siege of the South Pole" only one book, the late Sir Clements Markham's "Lands of Silence," has made any pretension to being a history of Antarctic exploration, and this carried the subject no more than eight years farther than Dr. Mill's standard work. Markham's book is therefore twenty years out of date, and having been published posthumously there was much that the author had no means of correcting; even Dr. Guillemard's able editing could not eliminate all its errors. The only other literature on the subject worthy of mention, apart from the descriptive and scientific works of explorers, is in the form of short articles and in books of a purely recreative character. Hence the time has come for recording, simply as history, the progress of Antarctic discovery which has abounded in epic incidents during the last twenty-five years.

The purpose of this book is to present a faithful record of events unencumbered by technicalities. The last chapter alone is intended for students, who may well begin with a reference to Appendix I. By this arrangement the lover of adventure and the more serious student will alike find their needs met.

The principal sources of information will be found in the Appendix; but the extent to which this book is authoritative may be judged from the fact that, in addition to the published records, the original diaries of several explorers, hitherto unpublished, have been placed at my disposal. This new material includes the journals of Sir Ernest Shackleton, Commander Wild, Commander Worsley, Mr. J. M. Wordie and Mr. R. W. James, as well as a mass of personal correspondence with all the living leaders of expeditions and many others. The whole book has been revised and approved by those most concerned, including surviving explorers and the relations or confidential advisers of those no longer with us. Among the leaders of expeditions must be mentioned Sir Douglas Mawson, O.B.E., D.Sc., F.R.S., Captain Sir Hubert Wilkins, K.B., Dr. J. B. Charcot, Captain John King Davis, Dr. W. Filchner and Commander H. J. Riiser-Larsen. Rear-Admiral R. E. Byrd, U.S.N. (retired), has also been extremely helpful. A further list of those

who have been good enough to assist will be found on another page, but my gratitude must be expressed here. There are so many to thank that it is impossible to admit one's obligations to each individually and it is hoped that all will accept a more general acknowledgment.

To this, however, there are a few exceptions, of whom my scientific collaborator, Mr. Theodore Savory, M.A., comes first. I am forbidden to thank him, but no one shall deter me from saying that he is an ideal collaborator—when not too busy. He has written Chapter VIII and Appendix II, besides giving general assistance and advice throughout the preparation of the book.

Dr. H. R. Mill occupies a unique position as the father of this work ; and a very good father he has been. With the keenest yet kindest criticism he has read the whole manuscript. He has devoted himself to the book for many weeks, has written the Introduction and in every way possible has proved a guide, counsellor and friend. No mere words can convey the indebtedness of the book and its author to him.

Another friend, Mr. J. M. Wordie, M.A., Fellow and Tutor of St. John's College, Cambridge, and Member of the *Discovery* Committee, has also assisted very materially in the preparation. He lent his diary of the *Endurance* Expedition and gave a great deal of valuable time to Chapters XI and XV ; in addition to which he has subjected the greater part of the manuscript to a careful scrutiny. I am most grateful.

Sir Douglas Mawson has also placed me under great obligations for the time he has spent over Chapters III, IX and X ; for his correspondence, photographs and detailed memoranda ; also for his data for Chapter XVIII as well as for rendering other assistance of great value. Mr. H. G. Ponting most generously presented thirty-six of his exquisite photographs, many of which are new to the public—a splendid gift—though unfortunately we are unable to reproduce them all ; he also gave much sympathetic help with Chapters VI and VII, and I heartily thank him.

Lastly, my wife very kindly appointed herself to the position of honorary secretary and has laboured many hours at the second typewriter. It is only fair that my appreciation of her work should be expressed here.

J. G. H.

STORRIDGE VICARAGE,

MALVERN.

April, 1932.

NOTE

THIS book was written mainly from the geographical point of view, but the detailed work in other branches of science carried out by most of the expeditions was by no means neglected. Mr. Theodore Savory had written an able and comprehensive survey of scientific research in Antarctica during the period. Unfortunately, after the first proofs had been corrected, it was found necessary to reduce the length of the book by approximately one-tenth. As the narrative could not be interfered with on the eve of publication, the scientific chapter, with very great regret, was deleted. Author and publisher tender their apologies to Mr. Savory for being unable to include these results of his labours.

September, 1932.

FURTHER ACKNOWLEDGMENTS

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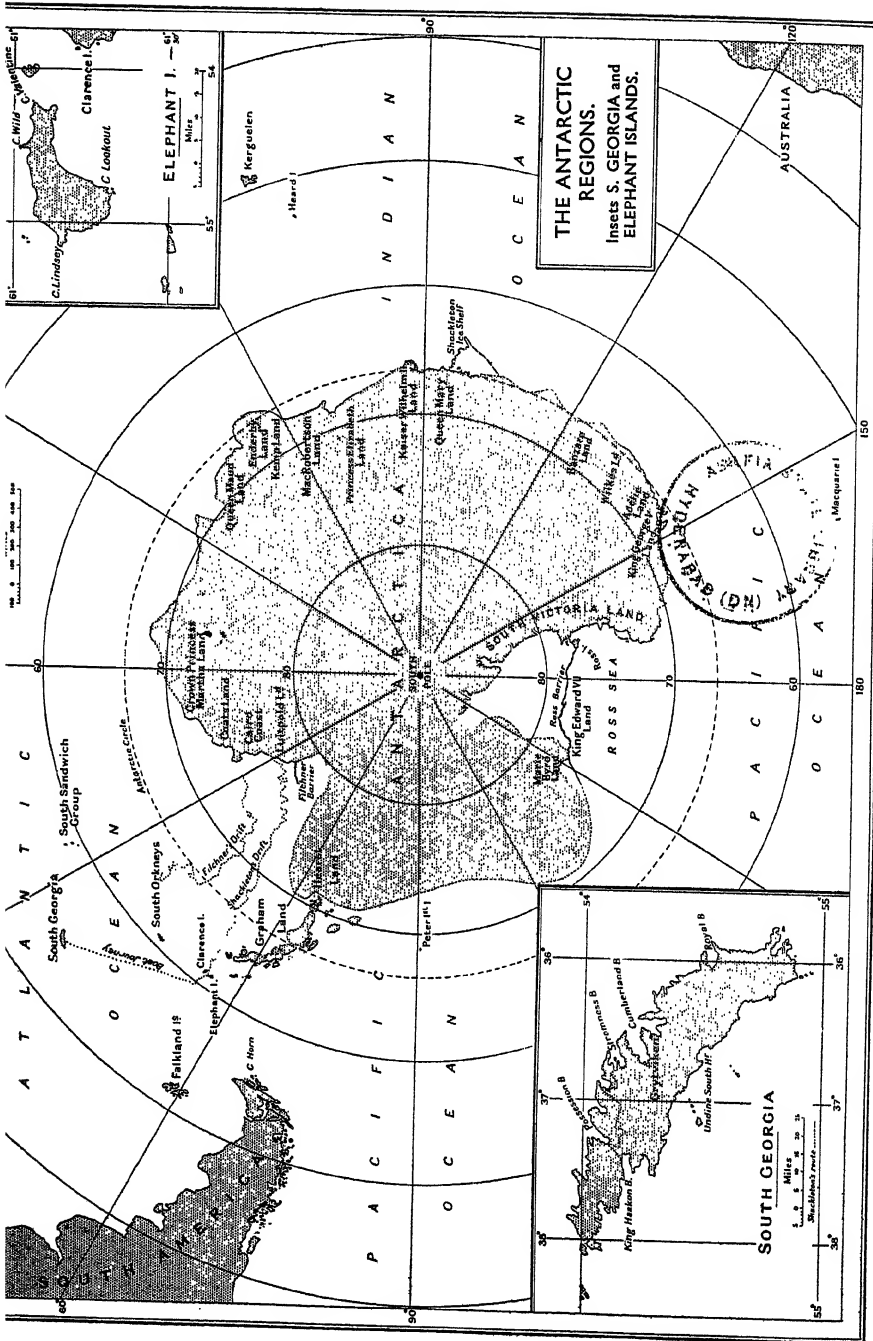
Mr. F. M. Johnstone for reading the whole manuscript and proofs ; Lieut.-Commander Geoffrey Rawson, R.I.M. (retired), for his personal appreciation of Lieut. Bowers and for help with Chapters I, II and VI ; Lady Shackleton for lending Sir Ernest's original diaries and letters, for permission to quote his books and for reading Chapters II, III, XI and XIV ; Lieut.-Colonel Sir Philip Brocklehurst, Bart., for checking Chapters II and III, with other kindly help ; Captain J. K. Davis, Director of Australian Navigation, for reading Chapters II and X, also for sending data, notes and memoranda ; Mr. C. S. Evans, Managing Director of Messrs. W. Heinemann, Ltd., for his gift of the *Nimrod* Scientific Reports ; Dr. Charcot for presenting all his published works with permission to quote them, for sending photographs (most of which, unfortunately, we cannot reproduce), and for reading and endorsing Chapter IV ; Captain Gjertsen for the trouble he has taken over Chapters V and XVIII ; Commander Hj. Riiser-Larsen for being good enough to correct part of Chapter XVIII ; Mr. Bjarne Aagaard for all his help in several chapters, as well as for permission to quote his monumental work ; Rear-Admiral E. R. G. R. Evans, C.B., D.S.O., for his kindness in reading and correcting Chapters VI and VII, also for permission to quote his " South with Scott " ; Captain Victor Campbell, R.N., for reading Chapter VII ; Dr. G. Murray Levick for the same and for contributing important memoranda and notes ; Dr. W. Filchner for correcting Chapter VIII ; Commander F. A. Worsley and Mr. R. W. James for lending their original Diaries of the *Endurance* Expedition with permission to quote them and for their extremely valuable help in criticizing Chapter XI, as well as for sending memoranda ; Rear-Admiral R. E. Byrd, U.S.N. (retired), who with the greatest willingness and courtesy has corresponded freely with the author, contributed valuable memoranda and given permission to quote his book, " Little America " ; Captain H. K. Salvesen, M.A., for his letter, given in Chapter XV ; Sir Hubert Wilkins for his kindness and consideration in checking Chapter

XVI; and the staff of the Royal Geographical Society for their usual courtesy and attention.

ALSO TO

the following publishers for their permission to quote the works named: Messrs. W. Heinemann, Ltd.—Sir Ernest Shackleton's "Heart of the Antarctic," "South," and Dr. H. R. Mill's "Life of Sir Ernest Shackleton"; Messrs. John Murray—"Scott's last Expedition" and Amundsen's "The South Pole"; Messrs. Hodder & Stoughton—Sir Douglas Mawson's "Home of the Blizzard"; Messrs. Philip Allan & Co. Ltd.—Commander Worsley's "Endurance"; Messrs. Cassell & Co. Ltd.—Commander Wild's "Shackleton's Last Voyage"; Messrs. Gerald Duckworth & Co. Ltd.—Mr. H. G. Ponting's "Great White South"; Messrs. W. Collins & Co. Ltd.—Rear-Admiral E. R. G. R. Evans' "South with Scott"; and Messrs. G. P. Putnam's Sons Ltd.—Rear-Admiral R. E. Byrd's "Little America." Acknowledgments are also made to all the authorities scheduled in the Appendix.

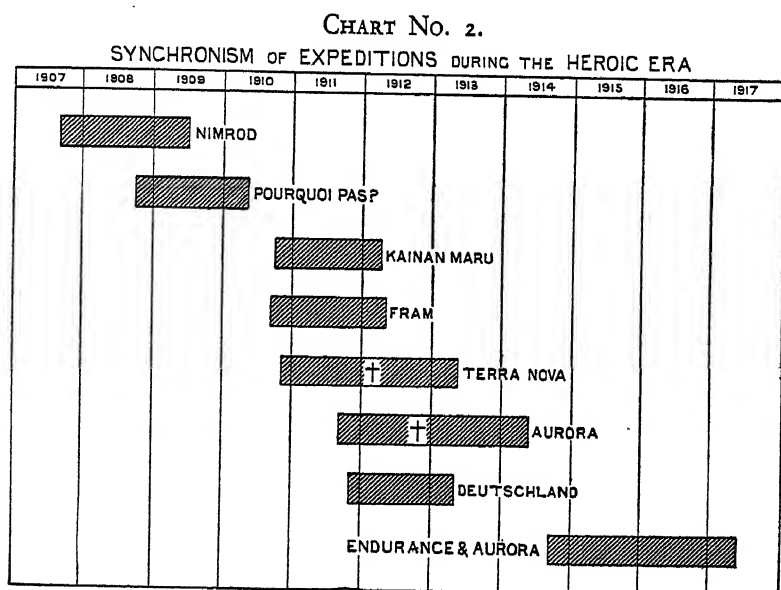
CHART No. 1.



CHAPTER I

THE HEROIC ERA OF ANTARCTIC EXPLORATION

AN important resolution was passed at the International Geographical Congress of 1904 affirming the desirability of following up the work of the Antarctic expeditions that had recently returned. Dr. H. R. Mill, the next year, recorded the undoubted fact that there was then no prospect of the pious opinion being translated into action; and this outlook remained unchanged during 1906, when no one dreamed that we were on the threshold of the most intensive period of Antarctic exploration on record.



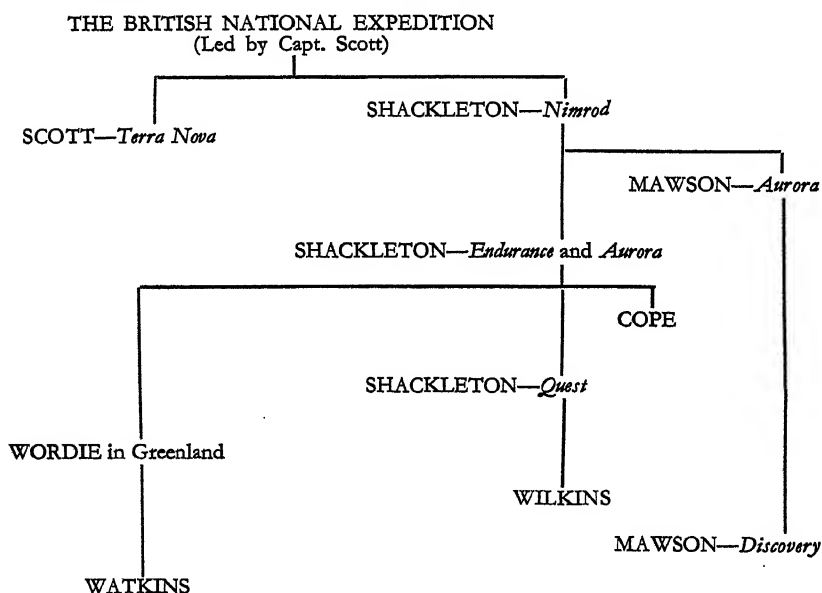
In the seven years from 1907 to the European War eight expeditions sailed for Antarctica and four of them were British: two were Shackleton's, one was Mawson's and the fourth was Scott's last expedition. Of the other four, France, Germany, Norway and Japan each sent out one expedition. A large amount of valuable work was accomplished by these ventures, for the most part under difficult conditions. The footsteps of the British explorers were continually dogged by disaster and some of them purchased their discoveries with their lives. As a small tribute to these gallant

men it is suggested that this period should be known as the Heroic Era of Antarctic Exploration.

This era may be said to have begun when Captain Scott embarked in the *Discovery*, four years before our period opens ; for all later British activity in Antarctica followed from the British National Expedition of 1901 to 1904. It led to Shackleton's three expeditions as well as to the *Terra Nova* Expedition ; and Shackleton's *Nimrod* Expedition gave rise to Mawson's two expeditions and five other Antarctic, besides several Arctic, expeditions. All these British voyages of discovery form a linked series.

CHART NO. 3.

THE POLAR PEDIGREE OF THE BRITISH EXPEDITIONS



The European War put an end to peaceful explorations and scientific work in Antarctica until the year 1920 when Lester and Bagshawe wintered in Graham Land, followed in 1921 by Shackleton on his third expedition from which he never returned. The Norwegians, who began whaling and exploring in Antarctic waters as early as 1892, started a new series of these operations in 1926 and have been in the Antarctic every year, except one, from then until now. The ships of the *Discovery* Committee have been working, mainly in the sub-Antarctic Zone, since 1925 ; and from 1928 to

1931 Sir Douglas Mawson, Sir Hubert Wilkins, Captain Hj. Riiser-Larsen and Admiral Byrd have been exploring the Southern Continent.

Perhaps the most striking feature of the period from 1906 to 1931 as a whole is the contrast between the *heroism* with which it opened and the *mechanism* with which it closed. It has been, in the use of technical appliances, a transitional period. This by no means denies the title of hero to the more recent explorers, but it states a general truth that deserves a little consideration.

Most of the earlier explorers achieved success with means that now appear to have been very imperfect; the man was greater than the machine. These men depended mainly upon themselves, as men have done for thousands of years. They were heroes, and their labours heroic, in the classical sense. Mechanical transport, that began in England a hundred years ago, has invaded Antarctica during our period and its effect there, as everywhere, has been revolutionary. The machine now tends to dominate the situation.

This is seen most vividly in aerial observing and surveying which is the outstanding feature of the most recent expeditions. The flying age of human progress embraces both the Poles. On the surface of the earth there is now the motor-sledge, and wireless telephony has ended the isolation of explorers. The mechanical stage now reached in the history of man is as ubiquitous as our civilization; thus it may be that the Antarctic heroic age has gone beyond recall, and this change, from the historical standpoint, enhances its importance. The personal exploits of Scott, Shackleton and Mawson should be worthily recorded and handed down to posterity among the noblest chapters of our British National Saga.

Mechanical means of exploration may appear devoid of romance; and yet romance, of a different kind, is associated with machines; each has its own particular attraction. The mighty deeds of Homer's heroes and the mediæval paladins usually depended more on brawn than brain; but this is less true as modern times are approached, and the great Antarctic explorers were men of mind as well as muscle. The increasing domination of intellect is good to see; though the mechanical adjuncts of to-day tend to eliminate the use of the body and we may be on the highroad to H. G. Wells' Martians or W. O. Stapledon's Big Brains.

The older methods of exploration, however, are by no means superseded by flying. It is impossible to obtain most of the geological, meteorological, glaciological and other data from the

air. No biological, oceanographical or magnetic researches can be carried out in an aeroplane. The older methods are unaffected except for the undoubted advantage of aerial scouting. An adequate air survey can now be made of the more conspicuous features on the surface of the earth; but the great value of flying is the rapidity with which discoveries can be seen. They must still be consolidated on foot.

As the heroism of explorers is the first feature of the period, the second is that of their geographical discoveries which have been their prime object throughout the period. The main purpose of this book is to give a faithful and full record of Antarctic exploration together with some reference to the more detailed scientific work that has been concurrently carried out.

There has not been a continuous development of scientific research from the beginning to the end of the period, for the achievements of some of the earlier expeditions in this important task exceeded those of the later ones. If we may judge by the number and bulk of their published scientific reports, the highest points were reached by Scott's last and Mawson's first expeditions; yet the quality and value of this work carried out by the *Nimrod* Expedition was so high that Shackleton was congratulated upon it by the Royal Society. The scientific level, from first to last, has been high; but the most recent tendency has been for technicians partly to displace professional scientists in the shore parties.

This period therefore has witnessed not only the introduction of mechanism into Antarctica but finally its domination over every other means of exploration. Petrol and electricity have latterly transformed expeditions to such an extent that mechanics have largely taken the place of pure science. Flying and aerial photography have changed the character of pioneering journeys, and the severity of life in the Southern Continent has been mitigated by the increased utilization of the resources of civilization, such as wireless telephony.

Antarctica is of unique interest from many points of view: it is the most remote, and the only polar, continent; it is still in the ice-age, with geological records of a genial climate in the past; it is the loftiest continent in the world, of about seven times the average height of Europe and fully as extensive; it has great barriers of ice attached to its coasts; and lastly, Antarctica alone has never been inhabited and is almost devoid of terrestrial flora and fauna.

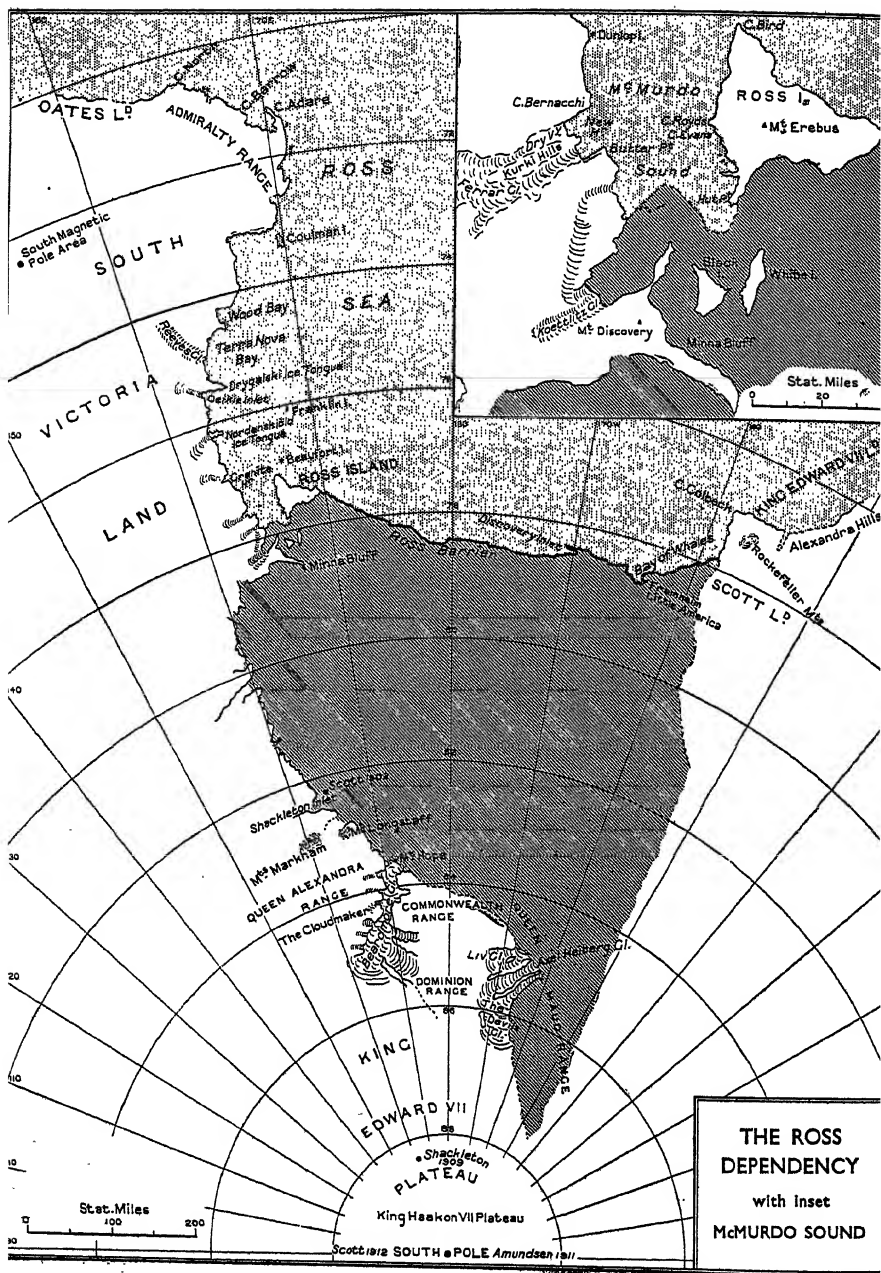
This polar continent, by the exercise of very little imagination

can be regarded as the mighty fortress of the Ice King who is protected by an array of extremely formidable lines of defence. Hundreds of miles out to sea from his coasts he sends his scouts in the form of icebergs, supported by huge masses of pack ice. These floes are his outmost works, of which the second line is a forbidding coast, almost devoid of harbours. Cliffs of ice and rock rise from a hundred to several thousand feet out of the sea and form an impenetrable obstacle to all who would attempt a landing. The third line is the blizzard belt, where storms of unparalleled fury and duration rack the air and oppose the farther advance of any who may have surmounted the difficulties of disembarking. Near this belt is the fourth line of defence which consists in coastal mountains and extensive barriers of ice. Lastly, the citadel may be imagined upon the desolate plateau that covers the central portion of the domain at a height of about 10,000 feet above sea level.

One important result of recent exploration in the far south is that Antarctica is now rising above the intellectual horizon of the civilized world. No more fascinating subject exists than the record of its great explorers, to which we shall shortly turn.

The story that follows is of great interest for another reason: it is the record of how, for the last time in human history, large parts of an unknown continent have been unveiled. The portions of the earth's surface that remain unexplored are not large enough to conceal even islands of great area and explorers soon must sigh, more literally than Alexander, for other worlds to conquer. The sub-Antarctic Zone is beyond the scope of this book except where it is crossed, and that only once or twice, in the course of the story. Each of the principal explorers will be introduced by a brief personal sketch, followed by a straightforward narrative of his aspirations and achievements. A short survey of the scientific results of the various expeditions will then follow and we shall conclude with a survey of the period.

CHART No. 4.



CHAPTER II

SHACKLETON'S ATTEMPT TO REACH THE SOUTH POLE

SIR ERNEST SHACKLETON deservedly became one of our national heroes, though he was even more than this; for, as Professor Sarolea pointed out in his brilliant characterization,¹ he was a national asset who increased British popularity throughout the world. This was not the result of any fortunate conjunction of circumstances but was achieved by pure ability combined with a natural unconventionality. The force and charm of a magnetic personality enabled him to do singlehanded what few other men could have done with generous assistance and made him the greatest leader of any modern expedition if not one of the greatest leaders of all time.

Shackleton's Yorkshire ancestry goes back to the thirteenth century. One of his progenitors fought on the Field of Flodden in 1513; another in the seventeenth century became a Quaker. The family removed to Ireland in the eighteenth century and one of the Irish Shackleton's taught the great Edmund Burke. As early as the year A.D. 1600 the family was entitled to armorial bearings, with the motto *Fortitudine Vincimus*²—the principle upon which the great explorer's success was based. Thus he came of an old cultivated family and his father was a graduate of Trinity College, Dublin.

Ernest Henry Shackleton was born in 1874, educated at Dulwich College and in 1890 went to sea. After thorough training on a sailing ship, he served in the Shire and Union Castle liners until 1901, when as a sub-Lieutenant in the Royal Naval Reserve he was appointed as Third Officer in the *Discovery*. During the British National Antarctic Expedition he became very friendly with Dr. E. A. Wilson who was intimate with Scott, and together they formed the party that made the record journey south in 1902-3. Shackleton was ordered home after this journey on the ground of ill-health, but he lived to prove that he had an exceptional consti-

¹ "Sir Ernest Shackleton, a Study in Personality," "Contemp. Rev.," March, 1922.

² "By Endurance we Conquer."

tution and was indeed one of the strongest men on the *Discovery* Expedition. He made up his mind before reaching England to lead an expedition himself, if possible, and his design continued to mature until the end of 1906 when Sir William Beardmore and the Misses Dawson-Lambton guaranteed considerable financial support, which enabled him to embark on the scheme.

On February 11th, 1907, he outlined the plan of his proposed expedition to the Kosmos Dining Club of the Royal Geographical Society and it was published in the "Geographical Journal" for the following month and in "The Times" for April 12th.¹ His Main Base was to be on McMurdo Sound and his most important journey would be a bold bid to reach the South Pole. This was to be no mere dash to the Pole, however, for scientific work would also be carried out. Shackleton wrote: "I do not intend to sacrifice the scientific utility of the expedition to a mere record-breaking journey, but say, frankly, all the same, that one of my great efforts will be to reach the south geographical pole."

That the Pole was to be no more than one of the efforts, if the most important, was seen by his proposal to send a party across the Barrier to King Edward VII Land and a third party to the South Magnetic Pole. The plan was excellent; but when Captain Scott heard of it he wrote to say that he hoped to lead another expedition to McMurdo Sound and asked Shackleton not to use "the old *Discovery* winter quarters." This request came as a severe blow to Shackleton who seemed to regard Hut Point as the only possible base in the vicinity; in spite of this he immediately accepted Scott's claim to consider the whole of Ross Island and McMurdo Sound as his own province, and changed his plans accordingly.

Shackleton agreed to find another base away from Ross Island, but the change of plan had to be announced without any reason being given, because Captain Scott's arrangements were not mature and in fact were not put into execution for another two years. Shackleton's new scheme is now seen to have been superior to his original proposals. There was to be one base, at Barrier Inlet (Balloon Bight) near King Edward VII Land, from which three journeys were to be made in different directions and all of them into the unknown. The distance to the Pole was about 80 miles less than from McMurdo Sound and thus the prospect of reaching it was relatively bright. Another favourable factor in this scheme

¹ See Chart No. 4, The Ross Dependency.

was that, on available information, Barrier Inlet was more accessible to ships than Hut Point.

The expedition was well equipped, with a strong ship, the *Nimrod*, though she was small. Lieut. Rupert England, R.N.R., was Master and John King Davis, who here first comes before us, was First Officer. On July 20th, 1907, the *Nimrod* sailed from London, and anchored for the night at Greenhithe. Here a message was received from King Edward, commanding the ship to call at Cowes, where His Majesty, Queen Alexandra, the Prince of Wales and other royal personages, inspected the ship and equipment. The M.V.O. was conferred on Shackleton, and Queen Alexandra presented the expedition with a flag for the farthest south. Calls were made at Torquay, St. Vincent and Capetown. Lyttleton, New Zealand, was reached on November 23rd, and it was found that only ten of the fifteen Manchurian ponies, which were to drag the sledges, could be accommodated in the ship. A motor-car also was taken. The *Nimrod* sailed on New Year's Day, 1908, when 30,000 people gave her a send-off from Lyttleton Harbour. The ship was so heavily laden that she had only 3 feet of freeboard with which to cross the stormiest ocean in the world; but Shackleton's originality had come into play and he had chartered the collier *Koonya* to tow him as far as the pack ice, thus husbanding the *Nimrod's* precious stock of coal. The New Zealand Government and Sir James Mills of the Union Steamship Company paid the whole cost of the tow between them. This was the first time that such a method of husbanding a ship's coal supply had been attempted. The *Nimrod* was towed a distance of over 1,500 miles successfully through the stormy waters of the Southern Ocean in spite of a very heavy gale that caught the vessels soon after leaving Lyttleton. The wind at times reached hurricane force and the *Nimrod's* bulwarks were smashed by waves estimated to be 40 feet high. The storm continued day after day until January 12th; two of the ponies were injured and had to be shot. During the whole twelve days there was not a dry place in the ship. Two days later the first icebergs were sighted, and on January 15th the *Koonya* cast off her tow and the ships parted company. As the *Nimrod* proceeded south she passed through a large fleet of low tabular bergs, but no pack ice. These bergs, about 20 feet high, were succeeded by larger ones about 100 feet in height. The Ross Barrier came in sight on January 23rd and its ice-cliffs were coasted eastward until the position of Balloon Inlet,

Shackleton's objective, was reached. His surprise was therefore great when he found the inlet had disappeared. Miles of the Barrier had calved off leaving a wide opening (which he named the Bay of Whales), instead of the narrow bight of *Discovery* days.

It was evident that a disaster of the first magnitude had been avoided. Had the rupture of the ice not taken place before the arrival of the expedition, the station might conceivably have been carried out to sea and all lives lost. Shackleton expected to find a landing-place on the coast of King Edward VII Land, which lay to the east of the Bay of Whales ; but the pack ice that had hitherto been successfully avoided now became a serious menace. Heavy ice lay to the north, leaving only a narrow channel between its edge and the ice-cliffs to the south. This channel was followed eastward until the pack pressed against the cliffs ; it was then seen that the ice was drifting south and the channel astern of the *Nimrod* was closing.

She was in danger of being crushed, and retreated at full speed, escaping with very little margin as she continued to the west. A very heavy pack still lay to the north, though farther away. Then a channel through the pack was followed, an easterly course being again attempted as soon as possible. Progress towards King Edward VII Land, however, was arrested once more by a thick consolidated pack and Shackleton had to steer north. All through the night of January 24th to 25th a zigzag course was followed, the ship pressing to the east until forced again north and occasionally even west. After struggling thus a whole day the ship was slightly to the west, though some miles to the north of the Bay of Whales ; but Shackleton persisted for another twenty-four hours. Captain England then pointed out to him that the position was becoming serious, for coal was running short, the *Nimrod* was leaking and in danger of being frozen in for the winter. Fog now came on—in itself a calamity when navigating among such ice, and one cul-de-sac after another was vainly tried until the only course that remained was to run for McMurdo Sound.

Shackleton refused to steer west until threatened with the destruction of the expedition. He felt himself in a dilemma, though it was not the danger that worried him but his promise to Scott. Ross Island was sighted on January 28th and when, early next morning, McMurdo Sound was entered, 20 miles of pack ice lay between the ship and Hut Point. This pack caused Shackleton to spend five precious days hoping the ice would go out before



By courtesy of H. G. PONTING]

EVENING IN THE PACK ICE



By courtesy of H. G. PONTING]

THE WESTERN END OF THE GREAT ICE BARRIER Showing Ross Island. Mt. Terror in the background

being forced to look elsewhere for a base. The result of his search eventually was the discovery of a site for his station as favourable as Hut Point, except that it was cut off from the Ross Barrier by open water in summer and was 23 miles farther from the Pole. These were Shackleton's reasons for delaying the debarkation.

On February 3rd it was decided to establish the station at this point, Cape Royds, and 180 tons of stores and equipment were landed by the 22nd when the ship sailed from McMurdo Sound for New Zealand. The shore party consisted of fifteen men, all told, about half of them being university graduates and most of the others sailors. The scientific staff was the finest hitherto assembled for any Antarctic expedition and most of its members have since achieved distinction. Those best known were Professor, now Sir Edgeworth, David, F.R.S.; Doctor, now Sir Douglas, Mawson, F.R.S.; Mr. R. E. Priestley and Mr. James Murray.

As Shackleton took his share in disagreeable and dangerous work, it was not long before every man was devoted to him. His presence inspired and brought out the best in them. While establishing the station they all worked themselves to a standstill; Mawson fell asleep with his feet on the cross-head of the ship's engine, which moved up and down at every stroke without awakening him and Davis succumbed on the wardroom table with a spoon in his mouth.

Cape Royds is in latitude $77^{\circ} 30'$ S. and longitude 166° E. The land was impassable from here to the Ross Barrier on account of the crevassed slopes of Mount Erebus, and the coast of Ross Island is precipitous. It was important that depots should be laid on the route to the Pole before winter set in, but here was another of Shackleton's difficulties: by the time his hut was built and he was ready to start depot-laying, all the ice in the Sound had gone out and nothing could be done because he was cut off from the Barrier. Had the ice gone out earlier, his base would have been at least 20 miles nearer the Pole; if later, the autumn depot would have helped him, the following season, to approach some miles nearer to his goal.

The polar night caused no depression of spirits among the men, and their health throughout the expedition remained excellent, though colds were caught while opening a bale of clothes packed in London. Sir Philip Brocklehurst was the only patient the doctors had among the shore party, his toes being frostbitten and

one of them having to be amputated. It was now that Shackleton was first called "The Boss"—a name that never left him. He was a disciplinarian who seldom needed to exert his authority, while he frequently showed a fatherly care for his men. Instead, therefore, of the polar night causing any difficulties, it cemented these men into a band of brothers. Shackleton was a genial spirit and disseminated the right tone throughout his personnel. Priestley says he was always the life and soul of any group in which he happened to be. Hence the winter ended with all hands keen and strong. It may be questioned if fifteen men ever faced a season's sledging as well equipped in health and spirits as Shackleton's shore party; and they needed to be fit, for the work before them was prodigious.

In addition to those who remained at the station to keep the continuous meteorological and other records, three parties went out: the Southern Party under Shackleton attempted to reach the Geographical Pole; a Northern Party under Professor David sought the Magnetic Pole; and a Western Party made a geological journey into the mountains that lay on the far side of McMurdo Sound. The proposed journey across the Barrier to King Edward VII Land was abandoned on account of the loss of ponies. The distance to the Geographical Pole and back to Cape Royds was 1,730 miles.¹ Of the 860 miles outward journey, more than 500 miles were unknown when Shackleton went out, and this portion of the journey proved, both in 1908 and afterwards, to be the hardest part. The whole distance had to be walked over snow surfaces. Shackleton knew that transport was the key to success and introduced ponies to pull his sledges; unfortunately, the fifteen animals he had originally provided had been reduced to four when the sledging season began, as four of the eight that were landed had killed themselves by eating sand. In addition to the ponies he had a few dogs; but most of the sledging had to be done by the men pulling their own loads.

Before the return of the sun on August 12th, 1908, Shackleton took Professor David and another man on a preliminary training journey along the polar route. They reached the *Discovery* Hut at Hut Point on the 14th and next day marched 12 miles in 8 hours over the Barrier and then camped. The temperature, — 56° F. or 88 degrees of frost, was much too low for sledging. In the

¹ All miles in this chapter and the next are statute miles unless otherwise stated.

night it was colder still, and as a blizzard threatened next day the party returned to Hut Point. Here the storm broke and held them until the 22nd. They tidied the hut as far as possible and then marched the 23 miles to Cape Royds in 12 hours. The chief result of this trip was to convince Shackleton that the motor-car would not be of much service on the polar journey, because of the unsuitability of the Barrier surface. The car, however, ran well on the sea ice and afterwards helped with the transport of stores. It also showed that petrol engines would function in Antarctica, thus pointing the way to motor-sledges and aeroplanes.

By the middle of September all the stores for the southern journey had been dumped at Hut Point, and more extended depot laying was attempted. Shackleton took out a party on September 22nd, man-hauling the sledges, and on October 6th they reached latitude $79^{\circ} 36' S.$, a hundred miles south of Hut Point. Conditions on the Barrier were still extremely severe, and the party returned to Cape Royds on October 13th. Final preparations were now completed for the polar journey. The party consisted of Shackleton, Lieut. Adams, Dr. Marshall and Frank Wild, a very strong team, each member of which was able, if necessary, to take bearings for the fixing of their position—a matter of vital importance in crossing boundless snow-plains. Marshall was the surveyor and proved most accurate in his charting. A theodolite was used for all observations and bearings. The compass was checked every day at noon. When the party set out, Shackleton's age was 34 years, Adams was 28, Marshall 29 and Wild 35, the average of these ages being $31\frac{1}{2}$ years.

The reduction in the number of ponies, first to ten and then to four, entailed the serious result that sufficient food could not be carried to reach the Pole and return on full rations unless a very high rate of travel could be maintained. Ninety-one days' supply, at 34 oz. per man per day, apart from water, was all that could be taken. The clothing chosen was deliberately light in weight to avoid perspiration. No ordinary cloth suits, nor furs, were worn; but only woollen undergarments, sweaters and windproof overalls. A depot of vital importance for the return was to be laid by Joyce off Minna Bluff at the end of January, 1909, and failure here would endanger the Polar Party. Murray was left in charge at Cape Royds and instructed as to his procedure in the event of Shackleton's Party not having returned by February 25th. The utmost limit for the ship to remain was fixed for March 10th, 1909.

The great journey began on October 29th, 1908, when the Polar Party set out from Cape Royds. Frank Wild's diary, hitherto unpublished, begins on this day and is made use of in the following record.¹ Hut Point was left behind and the long trail fairly entered on November 3rd. In addition to the four men, with four ponies pulling their sledges, a supporting party of six handsledgers, hauling a load of 750 lbs., accompanied Shackleton till November 7th. On the 6th, when only three days out from the advanced base the Southern Party started cutting down their food to make it spin out for 110 days. Thus began one of the greatest hunger marches in history.

Shackleton was the principal pathfinder of the British route to the Pole and he was soon up against difficulties. On November 5th a blizzard began which prevented progress for four days and, unable to see where they were going, the party stumbled into a maze of crevasses. This was a bad beginning, but it was counter-balanced by still further reducing the rations. Wild says that they found they had pitched their tent right on the edge of a bridged crevasse, but they did not move the camp. On November 9th the weather cleared and the crevassed district was left behind. The daily distance now lengthened from the previous average of 12 or 14 miles to 15 and 16 miles a day. Enough food was saved by November 14th, when a solar observation was taken, to supply the party, on its return, for two days before reaching the Bluff Depot. It was therefore *cached*, together with some spare equipment and the jam and sardines intended for Christmas.

As they went on their way, snow mounds, 6 feet high, were built at the outward camps to serve as guide posts for the return journey. The daily marches were still increasing and soon averaged between 17 and 18 miles. After rounding Minna Bluff, Shackleton set a course due south and this took the party out of sight of land from November 18 until the 22nd. They began to feel hungry on the 18th and except for one good feed on Christmas Day they continued so until February 23rd, 1909. The first pony was shot on November 21st, 1908, and they obtained about 150 lbs. of meat off it. On November 22nd Shackleton caught the first sight of his new land—great snow-clad heights in the south that rose higher every day. Two more ponies were shot, on November 28th and December 1st, and their meat saved all the rations except biscuits and cocoa. Wild says that the course was altered

¹ Wild's diary was quoted a little in "The Life of Sir Ernest Shackleton."

on November 23rd from south to south-by-east. The coastal range bounding the Barrier trended more and more to the south-east and, though they were gradually approaching it, pressed the party off their meridian. Each new mile, as they advanced, disclosed mountains, over 10,000 feet in height, upon which the eye of man now rested for the first time. Shackleton Inlet opened out and another new range appeared to extend indefinitely along its southern side.

On November 26th Wild wrote in his diary :

Perfect morning, warm sun and calm. Land quite clear for well over a hundred miles N. and S. of us. . . . We stopped at noon for observations, and found our latitude to be $82^{\circ} 11' S.$

FARTHEST SOUTH.

When we stopped to-night we were $82^{\circ} 18' S.$, so are now 1 mile further than man has ever trod before. We celebrated the occasion by a nice little tot of curacoa.

The most southerly points seen by Scott in 1903 had been Mount Markham and Mount Longstaff, the latter being isolated, on Scott's chart, from all other land. As Shackleton's party advanced farther and farther south it became evident that they were discovering one of the mightiest mountain regions in the world. Shackleton's diary refers to the consciousness they had of human insignificance among the newly-discovered giants. It became clear by November 27th that the coastal range would have to be crossed and might prove a serious obstacle to their attainment of the Pole. Nearly every day the pinch of hunger is mentioned in Shackleton's journal, though Wild does not refer to it until later ; the latter being a smaller man probably suffered less than the others. At this time, however, the weather was fine, the sun quite hot, and life was full of interest.

As Shackleton drew near to the new mountains he said : " There are enormous granite cliffs at the foot of the range we are passing, and they stand vertically about 4,000 to 6,000 feet without a vestige of snow upon them. . . . Altogether it is a weird and wonderful country." On December 2nd Wild wrote : " South of us a glacier opens up leading through the mountains in an almost due south direction, so after a consultation at lunch it was decided to make in for them, climb a mountain and see how the land lies." The camp that night was pitched in latitude $83^{\circ} 28' S.$ near a red granite mountain appropriately named Mount Hope, for next day

its summit was chosen as the point from which to reconnoitre a route to the Pole. On approaching the land a gigantic chasm, since named the Beardmore Bergschrund, was discovered. As it was about 80 feet wide and equally deep a detour to the west was necessary to avoid it.

The view from the summit of Mount Hope is in the historical succession that includes Moses on Pisgah and Balboa from his peak in Darien. Looking southward, 3,000 feet below, Shackleton saw the largest valley glacier in the world, its width exceeding the length of the Aletsch, the greatest glacier in Switzerland. The polar sun cast long shadows on its surface from the mighty mountains and precipices that lined its flanks. But the Beardmore Glacier, as Shackleton named it after Sir William Beardmore (now Lord Invernairn), was not merely of spectacular glory; it led almost directly to the Pole. A mountain that was named the Cloudmaker could be seen on the horizon, 50 miles to the south, pointing to the goal.

On December 5th the great glacier was reached by a convenient gap in the hills, near Mount Hope, called the Southern Gateway. Their road rose 2,000 feet in the first 2 miles; and an important depot, that we shall hear of again, was left by the foot of a fine granite pillar, 2,000 feet high, near the bottom of the glacier. The men of the party soon started falling into crevasses, and on December 7th an accident that might have been a disaster occurred. Frank Wild, who was leading the last remaining pony, writes:

Shackleton, Adams and Marshall were 10 yards ahead, when I suddenly stepped into space, felt a violent blow on my shoulder and a fearful rush of something past me, a vicious snatch at my right hand, and found myself hanging by my left arm only, in a horrible chasm, Socks (the pony) gone, and the sledge with a broken bow very nearly following; I got out somehow, and the other three running back, we quickly got the sledge into safety.

The snow bridge over a crevasse had broken and the pony was lost, but fortunately Wild and the sledge escaped. Had the sledge gone, the whole party would have been obliged to race back towards Hut Point with very little hope of ever reaching it. The loss of the pony and the food it represented may quite possibly have robbed Shackleton of the Pole.

Weeks of intense toil on inadequate food now followed. The sledge loads averaged as much as 250 lbs. a man and these had to be pulled uphill over soft snow, blue ice and crevasses. The work

could not be done without relaying, or taking half the load at a time; this had been the curse of Scott's Barrier journey in 1902-3. To save as much labour as possible another depot, with one of the two sledges, was left near the head of the glacier at a height of 6,000 feet in latitude 85° S. The men repeatedly fell into crevasses and were saved by the strength of the harness with which they were attached to the sledge. They were a mass of bruises from their falls and it was wonderful that they received no serious injuries. New mountains and branch glaciers came into view every day as they ascended, and some of the latter were from 10 to 15 miles in width. Old moraines were seen in terraces above the present level of the ice and the stratification of many rocks was clearly seen on the cliffs. Fossil wood was discovered, and what was even more important, Shackleton had the distinction of being the first to bring back specimens of coal from Antarctica.¹ To moderate, if possible, their unceasing pangs of hunger, the pony maize was ground up between two stones and consumed. By December 11th they were very hungry even just after eating their hoosh. This succulent dish was mainly composed of pemmican made into a stew, and it formed the *pièce de résistance* of the explorers' breakfast and dinner. "We have all got fearful appetites," wrote Wild, "and find our ration not nearly enough. . . . S. is in the best of spirits." It was remarkable that their tempers did not suffer from these privations. Naturally the one serious subject of conversation was food, and they regaled their minds, to encourage their bodies, with marvellous gastronomic inventions. They also dreamt of food at night without much satisfaction.

The Queen Alexandra Mountains, as Shackleton named those on the west side of the Beardmore, were the loftiest he discovered and ranged up to 14,600 feet. The Commonwealth and Dominion Ranges, on the left or east side as they ascended the glacier, appeared to culminate in peaks of about 11,000 feet in height. A few isolated peaks were found to break through the ice at the head of the glacier, in the form of nunataks. One of these was named Mount Buckley and contained the coal seam discovered by Frank Wild, who wrote on December 17th: "Started 7.30 and made for the land at the head of the glacier. . . . After dinner I climbed up on the land about 1,500 feet higher and could see over on the

¹ "The Heart of the Antarctic," I, 327; II, 299. "Reports on the Scientific Investigations, British Antarctic Expedition, 1907-9," "Geology," I, 121, 122, 249-55, 315, 316. "Geographical Journal," Vol. 34, No. 5, p. 489.

plateau. This was where I found the coal. There is no land in sight to the south."

On December 18th, at a height of 7,000 feet, they still further reduced their already insufficient rations, for they only had five weeks' food and were about 300 miles from the Pole. At breakfast they had one gill of hoosh and one biscuit. Lunch consisted of cocoa and three biscuits with a scrap of chocolate. As supper was little more substantial than breakfast, the men were badly under-fed and certainly had splendid constitutions to have avoided a breakdown. Wild wrote on the 21st :

36 degrees below freezing, with strong wind ; I guess that takes some beating as a record. Again we have spent the day among huge pressure mounds and crevasses. 22nd : Up here is rather too much of a good thing. We have had another awful day, pulling hourly with the alpine rope for ten hours.

On Christmas Day they were in latitude $85^{\circ} 55'$ S. and over 9,000 feet high. Their environment resembled the conventional Christmas much too faithfully for comfort, with drifting snow, 48 degrees of frost and a strong biting wind that seemed to go through them. They were at last fairly on the plateau, though it was still rising to the south, and the mountains could be seen trending to the south-east. For the only time on the journey they were replete with their dinner on that day, and most unwisely, as it seems, when in that condition, decided still further to reduce their rations. This really indicated a forlorn hope of reaching the Pole, 250 miles away. They had only about twenty-five days' much-reduced rations on which to march the 250 miles, so they then dumped everything but the barest necessities. The body temperature of each man was 2 degrees below normal, though otherwise Dr. Marshall pronounced them fit. They were living a healthy open-air life, but the trouble was that there was too much air, especially from the south ; and day after day this cutting wind opposed their advance. Yet ridge after ridge they crossed, ever onward, ever upward.

On Boxing Day they lost sight of the land behind them and saw nothing ahead except the desolate frozen waste and the sky. The following day they were pulling 150 lbs. per man in 40 degrees of frost and the half-cooked maize was giving them indigestion. Wild wrote : "When we camped to-night we . . . were absolutely done up. . . . I am sorry to say the new food scale leaves us very hungry all the time." Next day their altitude was 10,000 feet

and soft snow added to their difficulties in 48 degrees of frost ; but they had crossed the last crevasse and reached latitude $86^{\circ} 31' S$. On December 29th they were all suffering from headaches and some of them felt cold. Wild wrote : " The most awful day we have yet had. Nearly 2 miles above sea level, a strong head wind, an abominable surface, 41 degrees of frost, a dilapidated sledge and short food, with an uphill pull." December 30th was worse, for a terrific southerly blizzard forced them, after struggling on a distance of 4 miles, to camp. The surface was level, though covered with very soft snow. Even Shackleton now admitted that the food could not be further reduced to counterbalance the enforced delay.

The old year, 1908, went out in latitude $86^{\circ} 54' S$. with 40 degrees of frost and a strong head wind, while their faces were iced up from being lashed with drifting snow. All were on the verge of frostbite and very hungry indeed. On New Year's Day, 1909, they beat all polar records, north and south, by reaching latitude $87^{\circ} 6\frac{1}{2}' S$.¹ but everyone was weak from want of food, and next day they felt no better. Frank Wild, who then seemed the strongest, wrote : " At 5.30 we were all dead tired and S. had a frightful headache, so we camped. For my part I feel all right and wish S. was as strong as I am."

On this day, January 2nd, 1909, Shackleton came to the very sensible and correct conclusion that he must consider the lives of his companions, for he saw that if he went too far it would be impossible to bring them all back alive. They could not fight these inhuman forces of nature much longer, in their condition, and must be satisfied with achieving less than the Pole. On the 3rd they marched 11 miles at a height of about 11,000 feet ² and took their last latitude observation. The accuracy of the sledge-meter, on which they depended for dead reckoning, had been tested. On January 4th they took a risk that was almost foolhardy, by leaving a depot on the open plain, in order to push on a few miles farther.

They were weakening rapidly, Shackleton wrote : " Short food

¹ This had special reference to Peary's record of latitude $87^{\circ} 6' N$., which he claimed to have made on April 21st, 1906. An examination of his account of that journey, however, makes it uncertain whether he reached this latitude. He clearly attained latitude $85^{\circ} 12' N$.

² The heights given are only approximate. They were unreduced aneroid readings and probably a few hundred feet too high.

and a blizzard wind from the south, with driving drift, at a temperature of 47 degrees of frost (-15° F.), have plainly told us to-day that we are reaching our limit." The body temperature of three of the men failed to reach 94° F., "which spells death at home," wrote Wild, whose temperature was 95.4° F. They therefore left their last depot behind and lost sight of it in half an hour. 70 lbs. a man was harder to pull now than 200 lbs. had been three weeks earlier, which Shackleton confessed was a clear indication of failing strength. Their faces were cut and their fingers frostbitten. They wore a minimum of clothing to save weight and their boots were wearing out. Their clothes were patched and threadbare, and they continued to face half a gale of freezing wind for mile after mile. Wild said :

Realizing our condition, we have decided to shorten our march and take more food. We are therefore going on only three more days, which should put us within 100 miles of the Pole. It seems hard we cannot do the remainder, but as it is absolutely certain we should all die if we did, it would not do us or the world much good, and we have anyhow made a splendid record.

Thus the end was in sight. Conditions became worse on January 5th, for there were 8 inches of soft snow through which to plough and they were suffering from splitting headaches. Yet they marched 13 miles both on this day and the next against a strong blizzard and high drift. On the 6th Wild wrote :

To-day has been the worst we have experienced. Nearly a gale of wind in our faces, heavy low drift and 57 degrees of frost ; we have already found it utterly impossible to keep ourselves warm, and we have all been frostbitten more or less. It took S. over half an hour to get his helmet off to-night, there was quite a pound of ice on it. All our beards and moustaches were a solid mass of ice. Things were so bad this afternoon that we had to camp at 4.30, or I really believe we should have collapsed."

Then, on January 7th, there was—

a blinding, shrieking blizzard all day, with a temperature ranging from 60 degrees to 70 degrees of frost. It has been impossible, [wrote Shackleton] to leave the tent, which is snowed up on the lee side. . . . Fine snow making through the walls of the worn tent and covering our bags. . . . The wind has been blowing 80 to 90 miles an hour.

These were the conditions at a height of over 10,000 feet above the sea and when the men had been hungry for about two months. The blizzard continued all next day and marks one of the most severe human experiences on record ; in addition to which, their

only link with life was that last depot. Could they find it after the blizzard? Wild said: "In bed all day, howling blizzard, horribly cold, and crowded up in tent through drift pressing in sides." Shackleton's diary for this day, January 8th, reads: "Again all day in our bags, suffering considerably. . . . We weaken lying in the cold, for with 72 degrees of frost (-40° F.) the wind cuts through our thin tent." A full hurricane was blowing and only the dilapidated tent stood between them and death.

On January 9th their last bolt was shot. The wind dropped and they took their final risk in leaving the tent while they dashed $18\frac{1}{2}$ miles farther to the south, to latitude $88^{\circ} 23'$ S. There Shackleton with a few well-chosen words hoisted Queen Alexandra's flag and took possession of the plateau in the name of His Majesty King Edward VII. There was no break in the snowy surface as it extended towards the Pole and they felt sure that the goal of their ambition was on that plain, in which they were correct. Then they rushed back, found the tent and made another 4 miles towards the depot. They camped after marching over 40 miles between 4 a.m. and 5.30 p.m. Wild wrote: "Rush we must now as much as possible, as we have only fourteen days' short food to take us to our depot at the top of the glacier, 180 geo. miles and a great part of it over pressure and crevasses."

The point they had reached with such intense toil and hardship was 97 geographical or 113 statute miles from the South Pole. There, at their turning-point, a brass tube was buried in the snow with a record and a sheet of Antarctic stamps. Shackleton had been made a Postmaster by the New Zealand Government and some special stamps were printed for the expedition.

Dr. H. R. Mill has pictured the Polar Party returning, "with death on his pale horse, the blizzard, following close." The whole 800-mile journey was a flight from the place of death, the outer darkness of the world. Had their tracks been obliterated they might never have found the tent on retracing the $18\frac{1}{2}$ miles from their farthest south. There had been a blizzard since leaving the last depot on the plateau and if they failed to find this *cache* nothing could save them. But the storm had been a blessing. It had swept away the soft loose snow, leaving a better marching surface; it had left also the blocks of compressed snow, formed beneath their feet on the outward journey, standing up in high relief on the new surface. Thus there was a well-marked track to the depot which was picked up at 2.30 p.m. on January 11th.

A rapid return was being made and must needs be made if the food on the route was to suffice. The speed was increased by strong southerly blizzards that lasted until January 21st and then sprang up again when they had descended to the Barrier. A sail was improvised from the floor cloth of the tent and helped the sledge along. For the first 11 days of the return a distance of over 12 miles a day was averaged. On January 14th another biscuit was deducted from the daily ration of each man as some little security towards the 120 miles that then lay between them and the Upper Glacier Depot. Their speed increased, despite hunger and frost sores, and on the 19th they made their record march of 29 miles in the day.

Wild's diary at this time shows what the party was suffering. On January 13th he wrote: "Could not sleep last night for cold and hunger." They had to wait more than a month before they could eat their fill. Wild's diary entries become short, showing that the members of this party were concentrating their attention on flying from the place of death. The sledgemeter was lost on the 15th and three days later their outward tracks had disappeared; but these things were then relatively unimportant, for the mountain had been sighted. Then on the 19th we read: "I don't know how S. stands it; both his heels are split in four or five places, his legs are bruised and chafed, and to-day he has had a violent headache through falls." On January 29th they reached the Upper Glacier Depot with aching bodies after a rougher experience than usual. They had to descend the snow slopes off the edge of the plateau in a gale of wind and they frequently fell, Shackleton having two heavy falls that shook him severely. He was quite ill the next two days and walked alone, as he was unable to pull in the team. They were forced to push on, for they had only four days' rations to take them a distance of 80 miles down the glacier to the next depot.

By January 23rd nearly half their food was gone and yet they were not half-way to their nearest supply beneath the granite pillar. Now began a terrible race with death. Shackleton wrote on the 24th: "We have only two days' food left and one day's biscuit on much reduced rations, and we have to cover 40 miles of crevasses to reach our depot before we can get any more food." Wild said it was "a perfect nightmare. . . . Two or three days' bad weather now would send us all to the Happy Land." On the 25th, after five hours' marching, they had a cup of tea and then

went on for another three hours when they indulged in another cup, this time with two biscuits and two spoonfuls of cheese each. After another five hours on the march they had one pot of hoosh and one biscuit. Shackleton said: "We did 26 miles; fine weather. The food is all finished but one meal. No biscuit." They had been falling into dangerous crevasses, and each of them was only saved from death by his harness and by his friends.

The granite pillar, near which the Lower Glacier Depot lay, could then be seen; but death more nearly caught the party in the intervening miles than on any other stage of the journey. They had no solid food from the morning of the 26th until the evening of the 27th, and Shackleton could not write up his diary until the depot was reached. Then he said:

We came to the end of all our provisions except a little cocoa and tea, and from 7 a.m. on the 26th till 2 p.m. on the 27th we did 16 miles over the worst surfaces and most dangerous crevasses we have ever encountered, only stopping for tea or cocoa till they were finished, and marching twenty hours at a stretch, through snow 10 to 18 inches thick as a rule, with sometimes $2\frac{1}{2}$ feet of it. We fell into hidden crevasses. . . . Only an all-powerful Providence has guided our steps to to-night's safety at our depot. I cannot describe adequately the mental and physical strain of the last forty-eight hours.

When they became exhausted they slept for a few hours; and finally Marshall went on to the depot and brought back food for them all; he was less exhausted than the others with the pulling.

On January 28th they passed through the Southern Gateway down to the Barrier and thought themselves safe because there was food for six days and the distance to the next depot was only 50 miles. But there is no safety in the Polar Regions and Wild developed dysentery. On January 29th a blizzard came down on them and reduced the day's march to 2 miles, though resting in camp was good for Wild, who wrote: "I have been far from well to-day, my stomach is upset by the treatment it has been subjected to lately, which is making me feel very weak." He was not well next day, but the party accomplished 13 miles. Shackleton wrote that they were short of food, having only 20 oz. a day, and they felt very tired as well as hungry. Wild had a relapse on the 31st and Shackleton wrote no more than three lines in his diary on this day—a day that should be celebrated by all British people *in perpetuum* for one of the noblest personal deeds in our history.

One biscuit was served out to each half-famished man at breakfast. He could eat it then or later, as he pleased. On this

morning Wild ate his biscuit and as they were starting on the march—

he found Shackleton's hand slipping a biscuit into his pocket. "What's that, Boss?" he asked, and the answer was, "Your need is greater than mine." He resisted; but Shackleton was irresistible and fought in silence with his hunger, for he knew his friend was more hardly put to it than himself. The other two men never knew of the incident. . . . Until now the facts were written only in Wild's private diary. There he says, "*S. privately forced upon me his one breakfast biscuit, and would have given me another to-night had I allowed him. I do not suppose that anyone else in the world can thoroughly realize how much generosity and sympathy was shown by this; I DO, and BY GOD I shall never forget it.*"¹ He never did, as the record of their great friendship proves.²

It will be remembered that a ration of 34 oz. per man per day was taken for ninety-one days from Hut Point. January 31st was the ninety-second day and they thus had still 300 miles to travel on the pony meat and the food saved from the original ration. The brevity of the notes in Shackleton's diary at this time shows that he himself had hard work to manage the marching. On February 1st, 1909, he wrote only 2½ lines saying that Wild was still indisposed, but that the party had covered nearly 14 miles. Next day they marched the same distance, though Shackleton as well as Wild then had dysentery. On the 3rd they all had it and could not walk more than 5 miles. They were all too ill for travelling on the 4th and the outlook, for that one day, was very grave. This illness was due to eating frozen pony meat, of which there was plenty on the Barrier though some of it was unfit for human consumption. The meat must have been a godsend to the ravenous men, but the flesh of the last animal to be killed contained the toxins of exhaustion which caused some kind of poisoning.

A remark of Wild's on February 5th is amusing from a man who subsequently went out on three other expeditions: "This trip has completely cured me of any desire for more polar exploration." The following excerpts from his diary throw much light on the conditions during this part of the return journey.

February 6th: We have all got over our sickness, but our hunger is awful. February 13th: Arrived depot 11.30 a.m. 7½ miles. Dug up meat and biscuits, and all congealed blood we could find from where Chinaman was killed. . . . I am turning in more satisfied than I have been for months.

This depot was Depot B or Chinaman Depot.

¹ Wild underlined all the words in italics.

² "The Life of Sir Ernest Shackleton," 146-7.

Shackleton's head was aching on the following day and none of them felt quite fit. They had frost-sores on their faces, and they experienced some very low temperatures, as low as -35°F. , on the Barrier. From four to six biscuits a day, with a little pony meat, which they could not live without, left them all very hungry; and they had nothing more. The two ponies that were killed first appear to have been more healthy than the last one. On February 18th the sight of Mount Discovery put new life into them, as it was also visible from Hut Point. They were hungry and cold all day on the 19th, but Mount Erebus then came into view and uplifted their spirits, despite the fact that they had reached the end of their food again, except for some scraps, on that day.

Had they failed to find Depot A on the 20th they could scarcely have survived; but they did find it and enjoyed the Christmas delicacies they had *cached* there. Not the least enjoyment was the first smoke for three months. They had then to stake their lives on the Bluff Depot and trust that Joyce had done his work; Shackleton never doubted him, and with good reason, as will appear. "That depot," wrote Shackleton, "has been the bright beacon ahead through all these dark days of hunger." On February 21st they were cold again on the march, but this is not surprising as there was a blizzard and the temperature was -35°F. 20 miles were left behind them, for as Shackleton said, "Our food lies ahead, and death stalks us from behind." Another 20 miles next day brought them near the Bluff. They were again on the last of their food. "If we do not pick up the depot," Shackleton wrote, "there will be absolutely no hope for us."

The 23rd was a red-letter day in Shackleton's calendar. The sun shone in a cloudless sky as the wayworn men trudged along during the morning. They then took a spell off, and while they were resting Wild detected some flags waving in the breeze. A flashing light appeared as they approached, which turned out to be a biscuit tin so placed as to catch the sun's rays. The depot was 10 feet, and the flags 22 feet, high; but the party had been off the track and only the mirage saved them. Now comes a historic entry in Shackleton's journal:

Joyce and his party have done their work well. . . . Carlsbad plums, eggs, cake, plum pudding, gingerbread and crystallized fruit, even fresh boiled mutton from the ship. After months of want and hunger, we suddenly found ourselves able to have meals fit for the gods, and with appetites that the gods

might have envied. . . . I am writing in my bag with biscuits beside me, chocolate and jam.

They were all careful not to eat much at first. On the 25th Marshall had dysentery again and as there was a blizzard outside, the others spent a day of sweet idleness, eating and sleeping. At 1 a.m. on the 27th they turned out and marched 24 miles, though Marshall was still suffering. The *Nimrod* was due to leave on March 1st and it was necessary to push on; Shackleton therefore left Adams in attendance on Marshall, who was not fit to travel, and set out with Wild, late on February 27th, for Hut Point.

The distance was about 30 miles and they took their sleeping-bags, with one day's food. After great difficulties they reached the *Discovery* hut at 7.45 p.m. on the 28th. It was 117 days since they had left here with ninety-one days' food. The ship was some miles away but was called by heliograph and they were aboard at 11 a.m. on March 1st, 1909. At 2.30 p.m. Shackleton led out a relief party with Mawson, Mackay and McGillan, and reached the camp at 1 p.m. on the 2nd. Marshall was better and marched to Hut Point where they arrived at 9.30 p.m. on March 3rd. They were all safely on board by 1 a.m. on the 4th.

"This sledge journey is now regarded as the greatest feat of its kind either in the Arctic or in the Antarctic."¹ Shackleton's party had marched 1,755 miles, and he himself ended this splendid performance with a forced march of about 100 miles, 60 of which were to rescue Marshall, in four days. Perhaps the greatest wonder was that all four of the party returned from the interior of Antarctica, for the risks that had to be taken by handsledgers over that trail were excessive. They were so great that the journey was a heavy gamble with Nature, and Nature in these high latitudes is utterly remorseless. It was in the highest degree improbable that this journey could be repeated without loss of life, unless an efficient modern system of transport were adopted. Shackleton himself admitted the marvel of his party's escape from death time after time, a fact which he attributed to Providence.

Unless grave risks had been taken the discoveries could not have been made. These included the polar plateau, similar to that previously discovered by Armitage and Scott, but higher, and about 700 miles nearer to the Geographical Pole. Shackleton named it in honour of King Edward VII and it is the greatest plateau in the world. He also discovered 490 linear miles of

¹ "Geog. Journ.," March, 1922, 229.

mountain ranges which embrace the largest glacier known, more than 100 miles long. The mystery of the Ross Barrier had been further unveiled with the discovery of another 200 miles of its south-western coastline.

Shackleton failed to reach the Pole ; but he made a record polar journey and one that could never be beaten. It was a record, both in length and in the distance advanced, 363 miles, over a predecessor. Lastly, Shackleton had a remarkable gift for making correct and swift decisions that averted disaster, and his greatness as an explorer is largely attributable to this intuition. Success on his expeditions was very near his heart, but the safety and health of those who served under him came first ; and the fact that he never lost a life may be regarded as the finest of all his feats and the greatest of all his triumphs.

CHAPTER III

MOUNT EREBUS AND THE SOUTH MAGNETIC POLE

PROFESSOR T. W. EDGEWORTH DAVID (now Sir Edgeworth David, F.R.S.) is a graduate of Oxford University and passed from New College to the Royal College of Science, afterwards becoming a Geological Surveyor in New South Wales and Professor of Geology at Sydney University. He had held this appointment for sixteen years when Shackleton tempted him on board the *Nimrod*. His original intention was to return with the ship to New Zealand; Shackleton, however, persuaded him to remain and he did most valuable work. His first notable achievement was the leading of a party to the summit of Mount Erebus, his companions being Doctors Mawson and Mackay, both of whom afterwards accompanied him to the Magnetic Pole. Sir Philip Brocklehurst, Lieut. Adams and Dr. Marshall went as a supporting party.

The distance from Cape Royds to the active crater was about 15 miles. A column of steam, almost invariably visible from the hut, rose to a height of 3,000 or 4,000 feet above the summit before it was caught by air currents and drifted more horizontally. During the darkness a glow could be seen in the neighbourhood of the crater.

At 8.45 a.m. on March 5th, 1908, the Erebus Party started with the men hauling their sledges; and they camped that night, 7 miles from the station, at a height of 2,750 feet.¹ Next day the gradient became steeper, rising to one in five; the temperature was — 8° F. and the pulling heavy. Only 3 miles were made all day and camp was pitched, at an altitude of 5,630 feet, in a line with the oldest crater. The temperature fell to — 28° F. during the night. There are two old craters besides the present active cone and Professor David believed that lava had been poured out quite recently.

It was decided next morning (March 7th), that the supporting party should also continue the ascent, if possible, to the summit. A depot was therefore made and each man carried on his back a load of about 40 lbs., including provisions for three days. Camp 3

¹ See Chart No. 4 inset.



By courtesy of H. G. PONTING]

MOUNT EREBUS WITH STEAM CLOUD



By courtesy of H. G. PONTING]

CAPE ROYDS LOOKING SOUTH-WEST

was made that evening at 8,750 feet when the temperature was — 20° F. A strong wind arose in the night and worked itself up into a blizzard by the morning of the 8th. It increased in fury as the day wore on, and swept with terrific force down the rock ravine where they were camped, so that travelling was out of the question.

At 4 a.m. on March 9th the blizzard ceased and a start was made at 5.30, the angle of ascent being 34 degrees. When 800 feet below the rim of the second old crater lunch was taken. The party began to feel the effects of both altitude and cold, but they afterwards reached the second crater at 11,000 feet and were seen on its rim from the hut. Brocklehurst's feet were then frostbitten and he was left in camp. A small parasitic cone was found, also some remarkable ice-fumaroles of many weird shapes, the vapour from which froze as it was emitted. After the party returned to camp they had leisure to admire the magnificent view; below them was a vast rolling sea of cumulus cloud, and far away the Western Mountains glowed in the setting sun.

Next day, March 10th, the hypsometer was boiled on the rim of the second crater, and a height of 11,400 feet determined. The active cone was then attacked, but the party advanced slowly owing to the difficulty of respiration. The cone consisted mainly of pumice, frequently incrustated with sulphur; patches of yellow ice, in other places, were found to have been coloured by sulphur. At 10 a.m. one of the most remarkable mountains in the world was conquered. The rim of the active crater, when the party reached it, was $2\frac{1}{2}$ miles from the last camp and 2,000 feet above it. An awe-inspiring scene lay before them, thus described by Professor David:

We stood, [he said,] on the verge of a vast abyss, and at first could see neither to the bottom nor across it on account of the huge mass of steam filling the crater and soaring aloft in a column 500 to 1,000 feet high. After a continuous loud hissing sound, lasting for some minutes, there would come from below a big dull boom, and immediately great globular masses of steam would rush upwards. . . . The air around us was extremely redolent of burning sulphur. Presently a pleasant northerly breeze fanned away the steam cloud, and at once the whole crater stood revealed to us in all its vast extent and depth. Mawson's angular measurement made the depth 900 feet and the widest width about half a mile. There were at least three well-defined openings at the bottom of the cauldron. . . .

The height of the volcano, deduced from the average of several aneroid levels, as well as by hypsometer, with simultaneous readings

of the barometer at Cape Royds, came out at 13,370 feet. This is a thousand feet more than the height of Mont Blanc above Chamonix. When the observations and photographs had been taken, a survey was made of the main crater, and specimens of felspar crystals, pumice and sulphur collected. The depot left on March 7th was reached the same night. On the 11th, after descending a considerable distance, a blizzard threatened, and the party decided to make a dash for Cape Royds where they arrived in safety by leaving their sledge to be brought in later. Shackleton celebrated this remarkable First Ascent with champagne all round.

Soon after this exploit autumn was upon the wintering party and they began to prepare for the long Antarctic night. Breakfast at the station was at 9 a.m. and always began with porridge, followed, on certain days, by fruit. There was a light lunch, tea at 4 p.m. and dinner at 6.30 p.m., with tea served immediately afterwards. Shackleton was a great tea drinker and took it as late as 11 p.m. It was about 1 a.m. before all had turned in. Fierce blizzards were experienced during the winter, and objects weighing over half a hundredweight were moved by the wind. Mawson was obliged to invent a special apparatus to register gusts that broke the anemometer.

The journey of the Northern Party, in the southern spring, to the Magnetic Pole, was nearly as important as that of Shackleton's Southern Party, and the distance actually marched was more than two-thirds of Shackleton's own mileage. Professor David was in charge of this party with instructions to delegate his authority, if necessary, to Dr. Mawson. Dr. Mackay completed the unit. David was 51, Mawson 26 and Mackay 30 years of age on setting out.

On September 25th, 1908, Day transported some of the stores in the motor-car to a depot 10 miles out on the ice of McMurdo Sound, but blizzards delayed the start of the journey until October 5th, when the car took the party as far as the depot, where they slept, said the oracular professor, "with about 300 fathoms of water under our pillows."¹ The first 200 miles of their route lay over the sea ice northwards, along the coast of South Victoria Land. They began by crossing McMurdo Sound to Butter Point,

¹ "The Heart of the Antarctic," II, 77. All quotations relating to this journey are from Professor David's Narrative.

reached on October 12th. Progress was slow because the loads weighed half a ton ; almost from the beginning relaying was necessary. It was also necessary, in order to make the Magnetic Pole in the time available, to lighten the load on the sledges. Thus the second great effort of this expedition began, like the first, by cutting down food.

This was distinctly a scientific journey and interesting discoveries were made every day. The coast had not been traversed before ; it had only been charted from ships. Mawson now made a careful triangulation of the whole coastline, while some interesting topographical, geological and mineralogical discoveries were also made ; glaciological and other data were collected.

Cape Bernacchi was reached on October 17th, 1908, and South Victoria Land taken possession of, according to the old custom, for the British Crown. On October 20th terraced moraines were discovered in the strait between Dunlop Island and the mainland. Granite Harbour was reached on the 26th and the rocks were found to be of coarse red granite, intersected by black intrusive dykes. A perfect elysium for the mineralogist was discovered on the 30th and named Depot Island. Here a fireplace was built of magnificent hornblende rocks. The food problem had been exercising the minds of the explorers for some days, and when an effective blubber stove had been fashioned out of a biscuit tin the seals were called upon to pay their share towards the progress of the expedition. A depot was left on the island and letters were enclosed.

On November 5th, as they continued their progress northward, very interesting coastal panoramas came into view, with magnificent mountains, separated from the sea by piedmont ice. The Nordenskjöld Ice Tongue, 100 feet high, was crossed on November 12th and 13th. It protruded 20 miles into the Ross Sea from Charcot Bay and now seems to be inert. Dr. Mawson took sights for his triangulation of the coast from the highest point of the tongue, seeing Mounts Erebus, Lister and Melbourne at the same time. To the north of the tongue the rocky coastline was most impressive, for the tabular mountains were deeply intersected by vast glaciers and glacier-cut valleys. On November 20th an interesting cliff face was seen near Cape Irizar, 100 feet of granite being capped by 70 feet of blue ice. There were over fifty seals in a stretch of about 300 yards near this cape.

The Drygalski Ice Tongue now lay before them, bearing little resemblance to the Nordenskjöld Tongue already crossed, for its surface was heavily crevassed. It was reached on November 30th when great difficulty was experienced in hauling the sledges up the slopes to the top of the tongue. On surmounting this obstacle, a great billowy sea of pale green ice, gashed with deep chasms, lay before the party. Progress was painful and slow, for the men had to be roped and only a mile a day could be made. As there were 20 miles of this kind of going a retreat was decided upon, and on December 6th they started their second attempt to cross the tongue. This was at a point farther east, and from here they reached its northern side on the 11th where the ice was of the barrier instead of the glacier type. The tongue was 35 miles in length.

A good view was obtained over Terra Nova Bay to the north, and Mawson took some photographs as well as a series of angles with the theodolite. This locality was brought into history more prominently, four years later, by Scott's Northern Party. From Terra Nova Bay David's Party had to strike up through the mountains to gain the plateau on which lay their goal. They estimated the distance to the Magnetic Pole and back to the bay at 500 miles, and they already felt in a stale and weakened condition. A large depot, marked with flags, was left with all superfluities, including the geological specimens. Then, for the first time in Antarctic exploration, a stock of cooked seal and penguin meat was accumulated for the journey.

A blizzard prevented them from starting until December 16th, when it was an agreeable surprise to find that they could pull their sledge, which weighed 670 lbs., with comparative ease. On the 19th they crossed two tide cracks, half a mile apart, the water in both being salt. They were aiming for the Reeves Glacier, hoping by ascending it to reach the plateau; but after the exhaustion of hauling the sledge up a slope 80 feet high, they found higher and steeper slopes ahead, and the ice became a perfect network of crevasses. Into one of these Mawson suddenly disappeared and swung in space suspended by his harness which was somewhat worn. He was about 8 feet below the surface, until his companions raised him to safety.

This route to the plateau was evidently unsuitable for sledges, so another retreat was made on December 20th; but instead of returning over their outward trail, they struck south-west on to

the Larsen Glacier which had a gradient of 1,500 feet in a mile. Before ascending it, their interest was aroused by the discovery of a moraine containing marine organic remains and a bright green mineral forming thin crusts on a very pretty quartz and felspar porphyry. On December 22nd they found a most fascinating locality for the geologist and there secured an enormous siliceous sponge 2 feet high and 18 inches across. This place was about 30 feet above sea level and the ice slightly saline. A remarkable cone of solid ice was seen here, coated with highly fossiliferous marine muds and sand.

At the first camp on the Larsen Glacier avalanches were heard booming like distant artillery. A height of 1,200 feet was reached by Christmas Day when they made their first acquaintance with the plateau wind. Professor David awoke to find an accumulation of snow near his head. This was the first trick of the blizzard; it had worried a hole under the skirt of the tent and the drift was blowing in. The atmospheric conditions were similar to those that Shackleton's Party were enduring on the polar plateau, but not quite so severe.

The distance covered on Christmas Day was 4 miles, to a height of 2,000 feet, when David's Party were not only high but dry—a great advantage in freezing temperatures. On December 27th, as the gradient became easier over the rim of the plateau, 10 miles were accomplished. Their course was north-west (true), which led straight to the Magnetic Pole; and the team gradually settled down to leaving 10 miles behind them every day. Occasional areas of soft snow reduced their speed, but the plateau flattened out more and more, day by day, and the daily distance was afterwards increased. A height of 4,500 feet was reached by December 30th when a strong plateau wind met them and froze their breath, David wrote, "into lumps of ice, cementing our Burbury helmets to our heads." The wind also tore the tent. By January 4th, 1909, a height of 6,000 feet was attained and respiration became more difficult; the party also felt weaker, and they attributed this mainly to the rarefied air. The surface of the plateau usually was undulating, with the crests from 30 to 50 feet higher than the hollows. In addition to these undulations, which Shackleton did not find on the polar plateau, there were the common sastrugi pointing in the direction of the prevailing winds. These ridges were about 2 or 3 feet high.

Shortness of food is not mentioned in Professor David's

narrative until the first week in January, and then they seem to have suffered from thirst as well as hunger; they could not afford enough spirit to melt the snow for unlimited draughts of water or tea. On January 5th this must have been a trial to them, for the sun was oppressively hot. January 7th, on the contrary, was one of the coldest days they experienced, the temperature being -13° F. The weather in Antarctica thus seems to be as wayward as in more temperate countries. On January 9th the last of the mountain-tops dropped below the horizon and the men went on toiling up and down among the huge billows of a snowy sea. They were deeply impressed by the solitude and silence of the plateau. The horizontal compass was becoming very sluggish, which was pleasing; and Mawson took a series of magnetic observations as they proceeded. On January 12th he felt as if the Pole they were chasing was moving away from them and they would have to travel farther than they had anticipated. This would necessitate a shortage of provisions.

The food intended for their outward journey was exhausted on January 13th, but the dip of the vertical needle was only $89^{\circ} 10'$, so they could not turn back.¹ The daily swing of the magnetic dip is sometimes considerable, and so it was not necessary for the party to go forward until the vertical needle fell to 90° with the horizontal. This happens over a space of many miles, for the Magnetic Pole is actually an extensive polar area.

Longer marches were then made. On January 13th the distance was 13 miles, on the 14th over 12 miles, and on the 15th 14 miles. The dip had become $89^{\circ} 45'$, and in the course of twenty-four hours might become 90° at that place; but Mawson said they were only about 13 miles from the probable mean position of the Magnetic Pole, so they proceeded thither next day. The latitude of their turning-point was $72^{\circ} 25'$ S., the longitude $155^{\circ} 16'$ E. and the temperature exactly zero Fahrenheit. Professor David, according to his instructions, on January 16th, 1909, took possession of the plateau for the British Crown. The party then retraced their steps 11 miles to where they had left the sledge, making a distance of 24 miles for the day.

They were now about 250 miles from the Drygalski Ice Tongue where they hoped the *Nimrod* would pick them up. As she might reach there as early as February 1st, they would be obliged to

¹ A vertical instead of a horizontal magnetic needle is used for these observations.

average $16\frac{2}{3}$ miles a day in order to catch her. This distance was marched on each of the first three days, the weather then being fine. On January 19th they found the height to be 7,350 feet above sea level and the temperature -11° F. On the next day they ventured to increase their food nearly to full rations, as they were becoming exhausted for want of nourishment. On this and the following day the tale of their distance was 16 miles. Their lips, which had been cracked and bleeding for the last fortnight, were now healing; but they were all feeling the strain and the younger men were anxious about their leader. The plateau wind was an almost continual menace. The cold, even at the lowest temperature they encountered, -20° F. (52 degrees of frost), was endurable; it was the addition of a cutting wind that played havoc with the human body. The direction of the wind was often against them and frequently blizzards arose.

On the 26th the rim of the plateau with its steep slopes was reached, and the men had frequent falls. They had become acclimatized to the plateau, so that when, on January 27th, they had descended 4,000 feet, they felt enervated and stifled. The following day a sail was rigged up on the sledge and 20 miles were accomplished, though they found it less exhausting to pull the sledge with a following wind than to sail it. On the 29th another 20 miles were accomplished and next day they crossed the crevassed district. Here David fell through the treacherous surface but was held by the rope and climbed out. Mawson had sprained one of his legs before then, and it was now giving him much pain. On January 30th they had to cross a remarkable surface composed of curved ice plates or tiles which frequently let them through up to their knees. They said it was like sledging over a wilderness of glass cucumber frames.

Crossing the rough ice down by the shore was a great struggle. Mawson broke through the surface and was immersed in water up to his thighs, while the sledge frequently capsized on sidelong slopes. To their left was a huge cliff of massive granite rising up steeply to a height of about 2,000 feet. Three ice dongas had to be crossed, from 50 to 100 feet wide and from 10 to 20 feet deep, with precipitous sides and crevasses innumerable. Mawson's bad leg was very painful, and to make things worse snow began to fall.

At 7 a.m. on February 1st they estimated their distance from the depot on the Drygalski Ice Tongue at 16 miles. They had

then only two days' food left on a very much reduced ration, yet progress was exceedingly slow through 9 inches of soft snow. Next day at 8 a.m. the sun shone in a clear sky and they hoped that the *Nimrod* would be searching for them. One ice donga was crossed and, on encountering a second, everything was *cached* except the barest necessities and a forced march attempted. After going $3\frac{1}{2}$ miles Mawson swept the horizon with his field-glasses and saw the depot flag. Each of the others looked and saw nothing. When Mawson looked again the flag was gone and the horizon was boiling with mirage. The course was altered to make for this evasive signpost, and after going another mile they all saw it; but it was impossible to reach it for some time.

Progress was arrested by a ravine with vertical cliffs about 40 feet deep. A steep slope was descended, and two Emperor penguins were killed for food in the icy gorge. Unfortunately there seemed no way up the farther side; so they retreated by the way they had entered and then camped within 3 miles of the sea, having been on the march for twenty-three hours. At 11 a.m. on February 3rd, after only four hours' sleep, they started off again. When they had travelled $2\frac{1}{2}$ miles along the side of the ravine they came to a snow bridge and crossed in safety. Mackay slew a penguin, and after marching another 2 miles they ate it for lunch. At 10.30 p.m., when a further mile and a half had been sledged, they were all so tired that they were obliged to camp, though only a mile from the depot. Mackay then killed a Ross seal and they had a good supper before sleeping, each of them in turn keeping watch for the ship.

On February 4th the boom of a detonator was heard and the *Nimrod* appeared. David's Party had travelled 1,260 miles, of which 740 miles were relay work. They had been in the field 122 days, on 109 of which they had travelled, making an average of $11\frac{1}{2}$ miles a day. Their load was at first more than half a ton; but from the Drygalski Depot to the Magnetic Pole and back, 520 miles, they had dragged 670 lbs. which became reduced to 450 lbs.

Dr. H. R. Mill says that "Sir T. W. Edgeworth David and Sir Douglas Mawson proved themselves worthy to rank with the foremost polar explorers of all time." None of the journeys to the North Pole was as long as that of this party; and it is only surpassed in Antarctica by the great journeys of Shackleton, Scott and Amundsen to the Geographical Pole. The distance that the

sledge was pulled nearly equalled that of Shackleton's Party after the loss of his ponies.

We must now turn our attention to the remaining members of the expedition, and first to the Supporting Party Shackleton sent back on November 7th, 1908, when three days out on his polar journey. Joyce was in charge of this unit and elected to reach Hut Point in one march. The distance was 32 miles, and the feat was accomplished in $14\frac{1}{2}$ hours. They returned to Cape Royds on November 12th. Joyce had been trained as a taxidermist and was busy during the rest of November with his specimens of seals, penguins and skuas.

A geological reconnaissance on the north side of Mount Erebus was begun on November 23rd by a party of five, but a blizzard took a hand in this excursion. Camp was pitched on the first night, about 5 miles from Cape Royds and 2,000 feet up the mountain. Only one three-man tent had been taken, with the intention of one or two men sleeping in their bags outside. This camp was on a slope of smooth ice that ended in a vertical ice-cliff. Four squeezed into the tent for the night and Priestley settled down in his sleeping-bag on the glacier. About midnight the wind became very violent and the snowdrift as thick as a wall. *For three days it never ceased.*

The men in the tent could not cook any food, so they lived on biscuits and raw pemmican. They drank snow moistened by the heat of their hands. Joyce passed some food out to Priestley when the blizzard began; but the latter could eat little because he became thirsty, and his life depended on the drift being kept out of his bag, as it depended also on his not being blown too far down the slope. He was blown, inch by inch, for a distance of 20 to 30 yards, until he was able to wriggle his head to the wind, when he was safer; he knew there was a drop of a hundred feet at the bottom of the slope. At the end of the third day there was a slight decrease in the velocity of the wind, enabling Priestley to get inside the tent at the cost of both feet being frostbitten. He lay across the other men for some hours until, on November 27th, the gale had abated sufficiently for the party to return to the hut.

Preparations were now made for the western journey; this was a geological trip, and the party that made it consisted of Armytage, Priestley and Brocklehurst. They left Cape Royds on December 9th, 1908, and reached the stranded moraines on the

west side of McMurdo Sound on the 13th. On the 15th, as they ascended the Ferrar Glacier, Priestley began his geological survey. This is not the place in which to record the scientific achievements, but the party's experiences are of interest. The junction between what were then called the North and East Forks of the glacier, at a height of about 4,000 feet, was reached on December 20th. The grandeur of the scenery impressed the party, as it had impressed Captain Scott. A bleached skeleton of a seal was found 40 miles from the sea.

On December 27th the return was made down the glacier. The weather was unpleasantly warm, the snow thawing and the men getting wet, which is very unusual in Antarctica. Professor David's Party was expected to meet them at Butter Point and conduct a joint examination of the Dry Valley. The Geological Party therefore waited for them until January 6th, 1909, and then went over to the stranded moraines for 250 lbs. of specimens. On the 12th they visited Dry Valley, without waiting longer for David's Party, and a seal cemetery was found with the skin still adhering to some of the skeletons. The Geological Party, according to instructions, then returned to Butter Point, to remain until January 25th.

On the 24th they were encamped on the sea ice, which appeared perfectly safe; but when Priestley turned out at 7 a.m. he found they were adrift. Two miles of open water stretched between them and the shore and they were moving out to sea. The outlook was serious, as there seemed little hope of the ship picking them up or of the current changing its direction. They had four days' provisions and at once went on reduced rations. The Killer whales bumped the ice beneath them, and had the floe been thin enough their end might have been ghastly. Most of the day was occupied in exploring their floe, which at 10 p.m. seemed a little nearer to the shore. At 11.30 p.m. they were within a few hundred yards of safety and still approaching the coastal ice. Camp was struck with all speed and the equipment packed on the sledge. As soon as it had been pulled to the side of the floe, about 6 feet of the moving ice made a momentary contact with the shore and they rushed over. The floe moved away a few seconds after they had crossed and this time it went north to the open sea. Next day the *Nimrod* was sighted and called by heliograph. A depot of food was left at Butter Point for the Northern Party, which was a fortnight over-due when the Geological Party embarked.

Ernest Joyce travelled about 400 miles on the two depot journeys to the Bluff, to lay the depot for Shackleton's return, and Mackintosh accompanied him. These journeys have several points of interest. For the first time a considerable deviation towards Cape Crozier was made on the Barrier route to avoid the White Island crevasses, and this was afterwards followed by Scott. An old *Discovery* depot was found, from which Joyce ascertained the average snowfall and the movement of the Barrier during the previous six years. The snow was 8 feet 3 inches in depth and the depot had moved 9,600 feet in horizontal distance towards the east-north-east. The compressed snow therefore averaged about 13 inches and the Barrier movement 1,500 feet, or 500 yards, a year. The exact period was $6\frac{1}{2}$ years, for the *Discovery* depot was laid on October 1st, 1902. This 13 inches of compressed snow is equal to about $7\frac{1}{2}$ inches of rain. If the movement of the whole Barrier is approximately one-third of a mile a year, it takes a thousand years for the ice of its southern glaciers to reach the sea.

Little did Joyce and Mackintosh dream on these Bluff Depot Journeys that six years later they would be back again over the same route on the Barrier, and once more associated with Shackleton and with each other, but on the last occasion also with death.¹

The greater part of the ship's story is soon told. The *Nimrod* made an uneventful voyage back to New Zealand after disembarking the expedition at Cape Royds in February, 1908. During the winter she was overhauled and equipped for a second season in the Antarctic. Captain England resigned his command of the ship and Captain Evans, who had been Master of the *Koonya*, took over the *Nimrod*. He left Lyttleton on December 1st, 1908, met the pack in about latitude $66^{\circ} 30' S.$, passed through 60 miles of it in one day and sighted Mount Erebus on New Year's Day, 1909. Then trouble began. The ship was held up by pack ice off Beaufort Island, but worked her way, during the next two days, to within 28 miles of Cape Royds. As she was then firmly blocked, Æneas L. A. Mackintosh was sent with three other men to sledge the mail-bag to the winter station. They seem to have been properly equipped, and the distance when they actually left the ship is said to have been only 25 miles.

Mackintosh sent two of the men back in the afternoon and went on with McGillan. They camped on the pack, and next morning,

¹ See Chapter XII.

January 4th, found that open water lay before them. As all the ice was in motion they started back to the *Nimrod* but soon saw open water in all directions and that the floe was breaking up. Their peril was great and they dashed for the landward side, hoping to get ashore. They succeeded in doing this, after frantic efforts, by jumping from one piece of ice to another and dragging the sledge across the gaps. A quarter of an hour after escaping to land there was open water again. They were marooned on the flank of Erebus, soaked to the waist and half-frozen; their hands were cut and bleeding; they were worn out with their exertions and McGillan was snow-blind. Next morning he was in great pain and his eyes were completely closed up.

They had camped on getting ashore and Mackintosh kept a lookout for the ship, but it never came in sight. On January 6th both the men were snow-blind and could do nothing. They cut down their food, and were not well enough to attempt the hazardous crossing of the glaciers until the 11th. They had only enough food left for three meals, and they carried altogether 40 lbs. each of equipment. The mail-bag was too heavy and had to be left behind. They climbed about 5,000 feet, but having no spikes they often fell on the slippery ice. McGillan suddenly disappeared into a crevasse with the primus stove and all the food, which was lost. He was rescued by Mackintosh and fortunately was not much the worse for his fall. They then ascended higher, in the vain hope of escaping from the crevassed area. This way, however, was soon blocked in every direction except downwards, so in desperation they let themselves glissade, we are told, about 3,000 feet.

Marvellous to relate they reached the bottom alive at 4 p.m. on January 11th and two hours later they saw the hut. Then a blizzard began and they could not see 6 feet ahead. They stumbled on, not daring to rest for more than a few minutes, and were found by Bernard Day, at 7 p.m. on the 12th, near the hut, in a state of complete exhaustion. They soon recovered and three days later Mackintosh was able to start out with the Bluff Depot Party.

The *Nimrod* had escaped from the ice and arrived at Cape Royds on January 5th. She went out on the 7th to search for Mackintosh and McGillan and was caught in the pack again, this time being held up until the 15th, and drifting nearly as far as the Nordenskjöld Ice Tongue. On the 16th, Captain Evans found Mackintosh's deserted camp, the mail-bag was secured and the ship proceeded

to Cape Royds. On February 1st she started to search the coast of South Victoria Land for the Northern Party and as already related picked them up on February 4th. Winter quarters were reached on February 11th, Joyce's Party was embarked on the 20th and next day preparations were set on foot for the relief of the Polar Party.

The *Nimrod* with all on board set out on her return voyage on March 4th, 1909, and on the 6th was off Cape Adare. No ship previously had penetrated to the west of Cape North, but Shackleton's good fortune was uninterrupted, on this expedition and on this one alone, to the very end. He finished up by discovering over 45 miles of new coastline. The ship got as far as longitude $166^{\circ} 14'$ E. in latitude $69^{\circ} 47'$ S. on March 8th. Angles and bearings of the new land were taken and then it was high time to hurry home. On March 23rd the first account of the expedition was cabled, from Half Moon Bay, Stewart Island, to London. On the 24th this account occupied four columns in the newspapers and Shackleton was the talk of the civilized world. On the 25th, when the *Nimrod* entered Lyttleton, the ovation began.

Shackleton's biographer does not hesitate to say that no traveller ever woke up to find himself so suddenly and so universally famous. The King graciously and most appropriately led the applause by his cable of congratulation. Captain Scott immediately followed, while Shackleton swept through Australia on a roar of applause. Mr. Heinemann, his publisher, travelled to Italy and during the journey home made arrangements for producing "The Heart of the Antarctic." The President and Officials of the Royal Geographical Society met Shackleton at Charing Cross, where London began to express its opinion of what he had done, as the cheering of 10,000 throats echoed through the Strand and Trafalgar Square.

The rest of the story is well known to older people and the younger ones should read the full narrative in the explorer's biography.¹ He lectured all over the world and had interviews, by royal commands, with nearly every monarch in Europe. The King invited him to Balmoral and conferred a knighthood upon him. In America he was received by the President at White House. The British Government granted him £20,000 towards paying off the debts of the expedition.

Shackleton had torn a tremendous rent in the curtain of the

¹ "The Life of Sir Ernest Shackleton," by Dr. H. R. Mill.

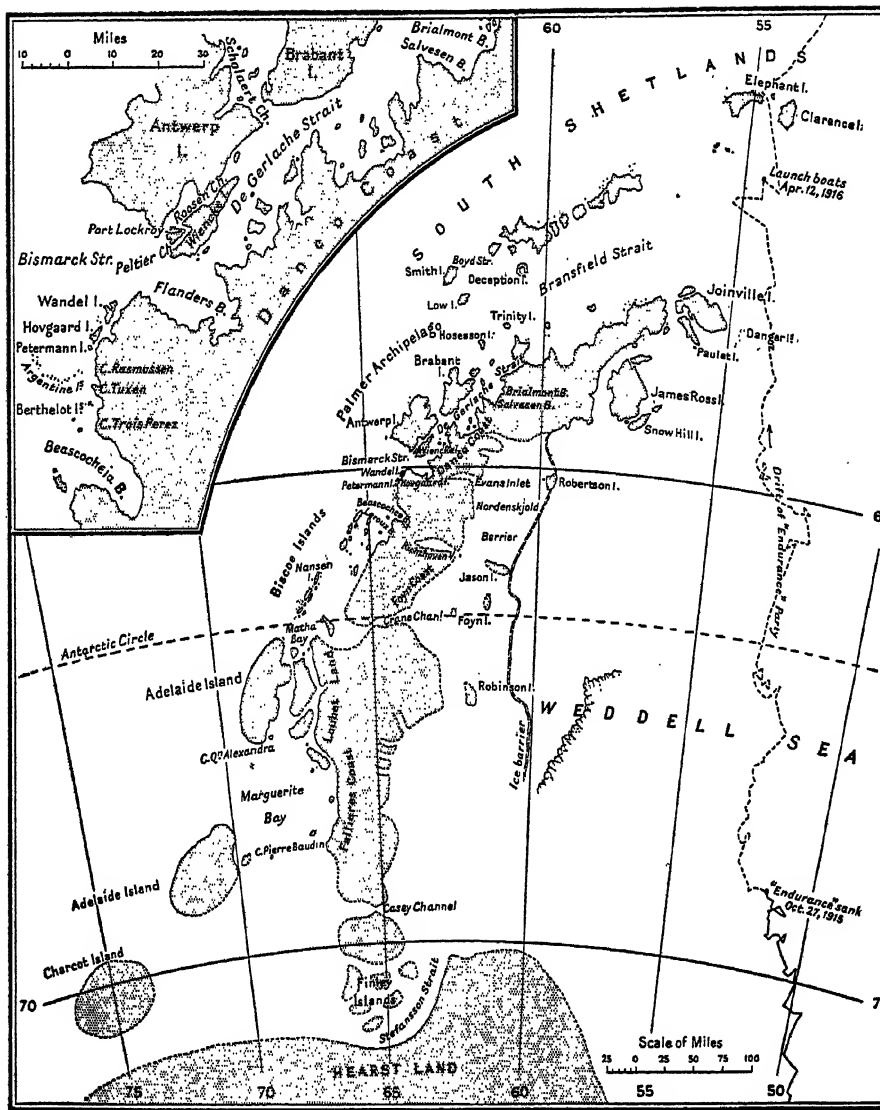
unknown, and the verdict of civilization was that he should henceforth rank with Cook, with Franklin and with James Clark Ross.

SCHEDULE No. 1

THE SOUTH POLAR RECORD

Explorer	Year	Highest Latitude	Miles Farther than Preceding	Geog. Miles Distant from Pole
Cook	1774	71° 10'	—	1,130
Weddell . . .	1823	74° 15'	185	945
Ross	1842	78° 9'	234	711
Borchgrevink . .	1900	78° 50'	41	670
Scott	1902	82° 17'	207	463
Shackleton . . .	1909	88° 23'	366	97
Amundsen . . .	1911	90°	97	0
Scott	1912			

CHART No. 5.



GRAHAM LAND AND HEARST LAND.

CHAPTER IV

CHARCOT'S SECOND ANTARCTIC EXPEDITION

DR. JEAN BAPTISTE ETIENNE AUGUSTE CHARCOT, D.S.C., is the son of the eminent Parisian neurologist, Professor J. M. Charcot, under whom Sigmund Freud once studied and who was not only a famous physician and scientist but equally a man of high moral sentiments. His great kindness towards his patients and his love of humanity were a fine example to the medical profession. His son, in addition to being a Doctor of medicine, an Attaché of the Pasteur Institute, a Laureate and Member both of the Academy of Sciences of France and of the Academy of Medicine of Paris, is Commander of the Legion of Honour, a Captain in the French Naval Reserve, Scientific Attaché to the Hydrographical Service, Director of the Laboratory of Maritime Researches, Member of the Supreme Council of the Mercantile Marine, Member of the Marine Academy and Vice-President of the Oceanographical section of the French Comité of Geodosy and Geophysics. At the time of writing he is acting as President of the French Geographical Society. He holds the Croix de Guerre avec Palmes, and the gold medals of the Royal Geographical Society and of the Geographical Societies of Paris, New York, Brussels, Antwerp and St. Petersburg.

Dr. Charcot has initiated and commanded a number of polar expeditions and scientific voyages. Indeed, he is still doing so, for he is at present organizing an expedition to Greenland in connection with the International Polar Year of 1932. He has been for many years an enthusiastic scientific yachtsman, and every summer he sets out, frequently to the Greenland Sea, on an oceanographical cruise. He was attracted to Western Graham Land in 1903 and adopted this district as his theatre of operations. In the year 1905, before his return to civilization in *Le Français*, he had determined to undertake another and more ambitious expedition to continue his researches in this locality. Such was the inception of his Second Antarctic Expedition, 1908-10, in which his prime object was scientific research.

His second object was geographical discovery. He knew that



DR. J. B. E. A. CHARCOT, D.S.C.

the district he had chosen was difficult and even dangerous, but that was an added incentive. Charcot persuaded the Academy of Sciences, the Oceanographical Institute and the National Museum to become Patrons of his venture, and an appeal was made to the public for the necessary funds. M. Briand, who was then Minister of Public Instruction, became interested in the scheme. The result was that the French Government made a grant of 600,000 francs at once, to be followed by two additional grants of 50,000 francs each, or in English money a total of about £25,000. The Geographical Society of Paris gave 10,000 francs, and other public bodies, together with generous private donors, made up a total of 800,000 francs or approximately £34,000. Half this amount was expended in a new ship, specially built for the expedition and admirably adapted for its service. Charcot followed Scott's example in the *Discovery* by wintering in the vessel, instead of in huts ashore. This necessitated accommodation in the ship for a crew of twenty-two men and a staff of eight scientists. Almost every comfort was provided, including a library of 2,000 volumes. The hold contained 250 tons of coal and 100 tons of stores, or provisions for thirty men for three years. By far the finest stock of wines that ever sailed to either of the Polar Regions was presented to the expedition. *Le Pourquoi Pas ?*, as the ship was facetiously baptized, proved a good weather boat and was powerfully built to resist all pressure. She was also faster than most polar ships; for her commander rightly reckoned that speed was vital in dangerous ice navigation, and she was built to lift when nipped between colliding floes.

Her equipment was a distinct advance on that of any previous polar ship: the oceanographical apparatus was completely up to date, some of it being lent by the Prince of Monaco; there was electric light and even a searchlight; a telephone was laid from the crow's nest to the wheel-house; and fourteen small boats of various kinds were taken, including a De Dion motor-boat that was most useful. Best of all, the scientific equipment was superb, and the staff that was to use it a well selected body. Dr. Charcot believed that discomfort made careful and accurate work difficult; hence the ship was built for the convenience of scientists.

Every member of the staff has his own private cabin where he can shut himself up and work. The biological and physical science laboratories, although small, are separate and comfortable; the photographic laboratory is huge and well-fitted. A nice warmth prevails all over the ship. . . .¹

¹ "Le Pourquoi Pas ? dans l'Antarctique," 217.

This description was written during the Antarctic winter.

Three Naval Officers were on the scientific staff, also one geologist, two naturalists and two doctors, including the Commandant. The ship's crew was chosen from 250 applicants. *Le Pourquoi Pas?* sailed from Cherbourg on August 31st, 1908, and then a violent storm drove the ship to St. Pierre in Guernsey. Setting out again on September 5th she called at Madeira, St. Vincent, Rio de Janeiro and Punta Arenas.

On December 22nd the South Shetland Islands were sighted and soundings taken in Boyd Strait, after which a call was made at Deception Island where 30 tons of coal were obtained, pendulum, meteorological and magnetic observations were carried out, and geological and zoological specimens collected.¹ On Christmas Day a course was set for the northern entrance of de Gerlache Channel and soundings were taken off Hoseason Island as well as at the entrance to Scholaert Channel. Roosen Channel was then navigated and Port Lockroy on Wiencke Island reached. A dredging was made in 68 fathoms on arrival, while an ascent was made to an adjacent summit to see if Bismarck Strait was free from ice. This could not be ascertained; so on December 27th the motor-boat was launched and Charcot set off with four companions on an attempt to reach Wandel Island, where he had wintered in 1904.

In negotiating Peltier Channel which, with Port Lockroy, had been discovered on the *Français* Expedition, the spray flooded the magneto and the motor stopped 2 miles from their objective. A current then carried them under Cape Renard and it became necessary to sail back to the ship; but the main object of the trip was achieved, as the strait was found open. The scientists worked in the vicinity until December 29th, when progress was continued in a leisurely manner that dredgings might be made and specimens collected. The winter station of the *Français* Expedition on Wandel Island was reached and most of the huts were found in moderately good repair. A hill was climbed to ascertain the state of the ice farther south, and then a north-easterly gale arose which held them up until New Year's Day, 1909. Fine rain fell on December 31st, 1908, the expedition at that time being north of the Antarctic Circle in latitude 65° S.

Charcot landed on Hovgaard Island and found his hydrographical signal still standing. He then pushed on to Petermann Island, where flocks of skuas attacked the party without inflicting any

¹ See Chart No. 5.

injury. A harbour was discovered on this island and named Port Circumcision; here the ship was brought on January 3rd, 1909, and the scientific staff set about their usual duties. Charcot and two officers started off in the motor-boat next day, in pursuance of the Commandant's excellent habit of reconnoitring ahead of his ship. Cape Tuxen, a high perpendicular cliff of green rocks, was easily reached; but shore ice and icebergs near the coast barred the way to the south, so a landing was made on the Berthelot Islands. These islands lie midway between Capes Tuxen and Trois Perez, in latitude $65^{\circ} 20' S$. From the summit of the largest island the whole coast appeared to be blocked, and some hardships were suffered before the ship was rejoined near Cape Tuxen. Charcot was no sooner on board than the vessel grounded on a submerged reef and sustained considerable damage. She then returned to Port Circumcision.

On January 12th, 1909, *Le Pourquoi Pas ?* set out on one of the most important parts of her cruise and discovered an opening in the coast between Rabot and Nansen Islands. This was entered and named Pendleton Bay in memory of the American Captain Benjamin Pendleton who may have seen it in 1829-30. A few hours after leaving here, early on January 14th, a very large opening appeared, to the south of the Biscoe chain of islands and north of Adelaide Island. Charcot named this opening Matha Bay in honour of his Second in Command in the *Français*. The new bay was surrounded by mountains seamed with glaciers, and two fjords were observed extending from it southward.

The cruise was then continued along the coast of Adelaide Island. This island had been discovered by Biscoe who had seen it only from a great distance and charted it no more than 8 miles in length. *Le Pourquoi Pas ?* steamed parallel to its western coast for about 10 hours at 7 knots, on a course, first south-west and later south-south-west, until nearly midnight of the 14th, when the land trended south-east and the southernmost point of the island was rounded into a large indentation of the mainland named by Charcot Marguerite Bay. The southern point of Adelaide Island was honoured with the royal name of Cape Queen Alexandra.

The ship was now, January 15th, 1909, in virgin waters, surrounded on the north, east and south-east by high, mountainous lands hitherto unseen by man. Marguerite Bay was greatly encumbered with ice, but progress was slowly made towards a small and lofty island that was named Jenny Island. Across a channel

to the west, 4 miles wide, the eastern coast of Adelaide Island was seen trending northward and having two superb peaks, 6,500 feet high, with glaciers discharging into the sea. While soundings were made, Charcot climbed to the crest of Jenny Island (1,460 feet), from where he saw the continuation of Loubet Land extending to the south-east and named it Fallières Land. Nothing was seen of Alexander I Land, though it should have been in view for the weather was beautiful and the air apparently clear. Reefs were numerous in the sea when the ship was got under way on a south-west course. The Fallières Coast being well lighted up by the sun, was seen to consist of conical rocky masses, standing out in great black triangles against the glaciers that they separated. Farther south appeared a remarkable cape (Cape Pierre Baudin), very red in colour and looking like a great broken-down tower.

Alexander I Land was first seen at midnight and then approached to within 15 miles, when progress was stopped by the ice. Local fog must have made it invisible from Jenny Island. The surface of some floes seen here stood more than 6 feet above the water. Sounding and dredging were done on January 16th at depths varying from 58 to 257 fathoms. An unsuccessful attempt was made to push through the pack eastwards to Fallières Land, and on the 17th a return had to be made to Jenny Island where the scientists immediately set about their usual work. Dr. Charcot was intensely desirous of wintering in Marguerite Bay, which would have been a splendid locality for a station, and he persistently strove to find safe harbourage here; but all the inlets were locked in ice. A safer anchorage than the one near Jenny Island had to be found on January 19th; and the following day the ship put out on another attempt to discover a secure wintering station. At 11 a.m. a tremendous crackling and thundering noise was heard and an iceberg was seen to split open and capsize. The sea boiled like a cauldron and the ship was in danger from some of the fragments.

On January 21st, 1909, the search for an anchorage was continued and some distance made towards Fallières Land. Several new islands were found, but the ice prevented the ship from advancing nearer to them than about 12 miles. The new lands were surveyed, and oceanographical work was carried out. Returning to Jenny Island early on the 22nd, another attempt was made to reach Alexander I Land, this time with success. *Le Pourquoi Pas?* advanced to within less than 2 miles from the ice-cliffs

at the northern end of the land. No break appeared in these cliffs, however, which were about a hundred feet high, so no way of attaining the interior was seen. Three small islands were discovered off the coast. Alexander I Land was found to be mountainous and ice-capped, but with very little animal life in its vicinity. There were only a few seals, five or six Adelie penguins, two skuas and two Snowy petrels on view. Scientific investigations were carried out and an attempt was made to reach the west coast of this land. A new position was attained from which some miles more were surveyed; and then, on the 23rd, the movements of the pack necessitated a hasty retreat to Jenny Island. The weather continued sunny and reminded Charcot of a fine winter's day at Nice.

On January 24th a party went out to explore the channels that debouch into the north side of Marguerite Bay, with the main purpose of ascertaining if Adelaide Land were an island. A huge fragment of whalebone was found on Jenny Island among some débris 26 feet above water level. One penguin was seen, but these birds were scarce in this district. A north-westerly gale sprang up on the 26th, which made the ship's position uncomfortable and showed the impossibility of wintering here. The sea became tinged with yellow diatoms or microscopic plants. The exploring party returned on the 27th, having experienced no storm in their land-locked channels. They had been nearly 40 miles north and found that Adelaide Land was an island, though the complete proof of this came later. Much scientific work was done during the next few days. On the 29th there was some danger from an iceberg bearing down upon the ship; and on the 30th the return northwards was begun, with the hope that winter quarters might be found in Matha Bay.

Charcot left a cairn, enclosing a record, on the raised beach of Jenny Island and rounded Cape Queen Alexandra about midnight on January 30th. At 1 a.m. on the 31st the pack was entered, progress being made through a lead. Matha Bay was re-entered at 6 p.m. and little ice found there, so Charcot sailed right up to its head and reached the embouchure of a new inlet (Lallemand Fjord), bounded on the east by Loubert Land. Hanusse Fjord, the strait that isolates Adelaide Island, was passed on the right as they entered the bay. The prospect of finding winter quarters in this locality looked bright, and on February 1st the greatest activity prevailed among the whole personnel of the expedition.

Embarking in a small boat, Charcot found some striated rocks,

also a rookery of Adelie penguins, but no secure anchorage for his ship. Crossing the bay, he entered Hanusse Fjord which was soon seen to be choked with ice. The final proof of the insularity of Adelaide Island was then discovered by the recognition of some peaks on the side of this fjord that had been seen by the exploring party from the south. Matha Bay was very interesting, though useless for a wintering station, so there was no alternative to Petermann Island. Port Circumcision, on this island, was reached on February 3rd, 1909, and the summer cruise came to an end.

Dr. Charcot was much disappointed at being unable to winter farther south. At Petermann Island, however, the ship would be as safe as could reasonably be expected in the Antarctic, and there were several other advantages in the situation: the island was favourable for scientific work; it was in the vicinity of Wandel Island, where observations had been taken four years earlier, so that comparisons could be made and a more intensive knowledge gained of the conditions prevailing in the locality than would be possible from a single station; the ice between Petermann Island and the mainland was less active than that around Wandel Island, and was thus more favourable to sledge journeys; there was also a large penguin rookery near the anchorage. Petermann Island is about a mile and a quarter long and 410 feet high, giving shelter to Port Circumcision on its south-east side.

The scientific station was established at once. A wooden hut with double walls was erected for terrestrial magnetism, and a second one to contain the apparatus for atmospheric electricity. The meteorological screen and instruments were fixed near the ship. A third hut was built for the seismograph and a fourth for the transit instrument. All these places were connected up and lighted by electricity, an advantage no previous expedition had possessed. Electric lighting is valuable because it gives a good light to read the instruments and thus greater accuracy is secured. Time signals were electrically given from the ship. One of the saloons in *Le Pourquoi Pas ?* was used as an annexe to the biological laboratory, and there was a well-equipped workshop on board. Two tide registers were installed in such a manner that the gauge could be read from the ship, and the windvane on the summit of the island was equally convenient. The month of February was mainly occupied with setting up the station; but Charcot also made a trip, on the 9th, to the Argentine Islands.

On February 10th another boat journey was made, this time to Wandel Island, and during the outward run a whale was seen in some shallows, exploring for deeper water; after five or six minutes of rising and sinking, he found what he sought. On February 16th two members of the staff crossed over to Danco Land where they found a good landing-place. The sun was so hot on the 17th that the men worked in their shirt-sleeves. A fine specimen of a sea-leopard was shot. Large areas of red and of green snow were seen, this coloration being due to diatoms or minute plants.

On March 7th a successful exploring trip was made in the motor-boat, towing a large canoe. A cairn was raised on Cape Tuxen to serve as a hydrographical signal. The cliffs of Cape Trois Perez were found to be over 1,500 feet in height, precipitous, majestic and sinister. Beascocheia Bay opened out beyond this cape, ending in a precipice and a large glacier. Over the glacier a vertical wall of rock could be seen, which was thought to be part of the upper plateau but is inaccessible from the west. Charcot proceeded about 11 miles up the bay and turned back 4 miles from its head. Surveying and geologizing delayed the return to the Base from Cape Trois Perez, where another call was made, until darkness had set in. The remainder of the journey, among huge icebergs, was most impressive and not devoid of danger, but the searchlight guided the party back to the station. A distance of 50 miles had been covered during the day.

On March 9th Dr. Gourdon, the geologist, took a party across the strait to explore a glacier in Danco Land. The ultimate purpose of the trip was to find a way to the interior, and in this the reconnaissance was, for the time being, successful. No difficulty was experienced at this point; but the following day, when another attempt was made, at Cape Rasmussen, it proved impossible to advance beyond a height of 3,000 feet. The calving and capsizing of icebergs and large iceblocks near the ship was very frequent, so that constant vigilance was required to avoid damage. Dr. Charcot said that his safety was only comparative.

On March 19th Dr. Gourdon again visited the glacier and established a camp there. Three seductive lateral valleys were discovered which seemed to invite a journey into the interior, but two of them proved useless. A week later a fall of ice at the landing-place almost cut off the glacier from the ship; and when, on April 9th and 10th, another attempt was made, it was repulsed by thick

snow. A faint aurora was seen on April 25th and the magnetometer registered a disturbance. Tow-netting for Plankton or marine micro-organisms was continued till the end of this month when the wardroom skylight was gay with hyacinths. The weather then broke up and for twenty-one days the tempest continued without respite; the anemometer was broken and a deep rumbling of surf and crashing of ice resounded from the distance.

The scientific staff worked with diligence every day except Sunday which was always a day of rest and recreation. Good fellowship was unimpaired throughout the expedition. Optional classes for the crew were held during the winter; cards were never played. Special occasions were celebrated as frequently as possible and the fourth anniversary of the return of the *Français* Expedition to Paris was honoured by a champagne dinner.

The sea to the west was open at the end of May, though the ice on the channels could still be used as a platform for taking soundings and samples of water from various depths, as well as for tow-netting. Petermann Island being in latitude $65^{\circ} 10'$ S. the sun made a short appearance every day at midwinter. Some birds remained throughout the winter, though the sheathbills were rather scarce and only a few penguins appeared occasionally. The beautiful Snowy petrels were the most abundant.

A terrible storm arose on June 16th and broke up all the ice in the harbour. The ship was in great danger and the rudder smashed. On Midwinter Day, June 21st, a form of scurvy made its appearance among the men, which Dr. Charcot discussed with the present writer in 1930. The disease was really *preserved food sickness* and entirely due to the consumption of some preserved foods. The cure was fresh meat or condensed milk; but a diet of seal and penguin meat was insufficient if the smallest quantity of tinned meat was also eaten. Dr. Charcot and other scientists suggest that the cooking of the meat in its tins may be the cause of the disease.

The Commandant's birthday on July 15th was celebrated with more than the usual *éclat* and the finest of his own private wines were broached for the occasion. During the latter part of this month, and the whole of August, Charcot's main concern was the health of his men. He himself was also very unwell, but he fought his indisposition most gallantly and eventually conquered. By September the worst troubles were over and spring excursions

were under consideration. On the 18th of this month Dr. Gourdon set out with a party to ascend the Middle Glacier in Danco Land. There was the usual difficulty with crevasses; fog and drizzling rain were encountered and a great deal of relaying had to be done. On September 22nd a height of nearly 3,000 feet was reached but further progress was possible only in one direction. Then there was more fog, followed by snow which fell continuously for ninety-six hours. On the 27th the blizzard ceased and next day in a temperature of -19° C. the journey was resumed.

A pass was seen ahead and for this the party aimed, with avalanches crashing all around them. The valley they traversed was choked with snow and led to a vast amphitheatre that proved to be a cul-de-sac with apparently an icefall at the inland end. The return was uneventful and the ship was reached on October 2nd. Though the attempt to attain the summit of Graham Land was unsuccessful, valuable topographical, glaciological and meteorological observations were made.

On November 9th the first penguins' eggs were laid and the staff enjoyed their first omelette of the season. The ship was then prepared for leaving her winter berth; repairs were carried out and instruments taken on board. A cairn was built, surmounted by a signal and supporting a large leaden tablet with a record of the expedition. *Le Pourquoi Pas?* put to sea on November 26th, 1909, and entered the volcanic harbour of Deception Island the following day. When her hull was examined a serious injury was discovered below the water-line. To navigate among ice in this condition was most dangerous, yet Charcot carried out the remainder of his programme as if nothing were wrong.

After visiting and making a circuit of Bridgman Island, Christmas was spent in Admiralty Bay. On December 30th, 1909, a final call was made at Deception Island, leaving again on January 6th, 1910, for the last part of the Antarctic cruise. A course was set to the west of the Palmer Archipelago where visibility was low and no land seen until the 11th, when Alexander I Land was again sighted. Then came the most fitting climax, the greatest discovery, of the expedition. Charcot wrote:

About nine o'clock (a.m.) from the crow's nest I thought I saw something strange in a south-easterly direction. Is it an iceberg or . . . ? I dare not write the word.¹ After a hurried lunch I betook myself again to the crow's

¹ "Charcot Land, 1910 and 1930," "Geographical Review" published by the American Geographical Society of New York.
C.S.P.

nest with my field-glasses. There was no longer room for doubt. Those pointed summits rising into the sky far away there to the south-east were no icebergs but land, a new land, a land visible now to the naked eye, a land which we might call our very own. . . . The fine weather allows us to take observations and to place our discovery in longitude $74^{\circ} 50'$ and latitude $70^{\circ} S$.

At the suggestion of Charcot's staff, and independently by the late E. S. Balch of Philadelphia, supported by other geographers, this land was named Charcot Land. Dr. Charcot says he must yield to the amiable insistence of these gentlemen but adds: "I wish it to be understood that it is the name of my father, Professor Charcot, who has done so much for French science, that is thus honoured, and not mine."

The following day, January 12th, 1910, the ship was kept to the edge of the pack and passed to the south of the seventieth degree of latitude—the record south on this meridian. The course lay almost parallel to, and a little south of, that of the *Belgica*, as also of Bellingshausen's course. Soundings were taken and two dredgings made which brought up some rocks. On the 13th the ice pressed the ship to the north-west and there was much fog. Next day Charcot continued sounding along the edge of the pack; birds were numerous, indicating land to the south, and the number of icebergs increased. Then Peter I Island broke through the mists at a distance of only 2 or 3 miles. Thus was Bellingshausen's discovery of the year 1821 at last seen again after the lapse of ninety years.

A blizzard soon blew up from the south-east and the situation of *Le Pourquoi Pas?*, menaced on all sides by icebergs, became for some time dangerous. Suddenly, however, she ran into drift ice and was safe. On January 16th latitude $69^{\circ} 12' S$. was reached again and a sounding gave 2,160 fathoms. All hands were now worn out, though they remained quite cheerful. The edge of the pack was still being skirted on the 17th at some miles to the south of latitude $69^{\circ} S$., banks of fog being very frequent. Charcot's Journal must again be quoted:

January 19th: We are now in the longitude which the great British navigator Cook reached on January 3rd, 1774, $106^{\circ} 54'$ west of Greenwich, $71^{\circ} 10'$ south latitude, which remained the record for a long time. At the same place we are stopped by the pack ice in $70^{\circ} 30'$ south latitude. . . . It is interesting . . . to notice that we found at the same spot as Cook a deep notch in the pack; it was certainly not an ordinary indentation caused by the prevailing winds.

Charcot was now entering unknown waters and once more we quote his diary :

January 20th : At 4 a.m. I set all sail and steer for the west. We are in $68^{\circ} 32'$ south latitude, and we are thus crossing, at a speed of 8 knots, a region never yet explored. . . . We are . . . more than 3 degrees (180 geographical miles) farther south than our predecessors. January 21st : We had already reached an un hoped-for latitude and continued on our course southward. In the afternoon our way was blocked by the floating ice and we had to stop. We moored the ship to a large block of ice and proceeded to take in water. . . . Rouch took advantage of the stoppage to take a sounding and found a depth of 561 fathoms with a rocky bottom.

On January 22nd Charcot steered west and then a little to the north, following the edge of the pack. A sounding of 1,247 fathoms found no bottom. It now became imperative to make for home.

The fight was over and the polar warriors sought for rest, though their hearts were uplifted by the victories they had won. Theirs had been a glorious campaign and not a life had been lost. They had borne the torch of knowledge throughout hundreds of miles of the unknown and returned home with their ship laden with a cargo more precious than the gold of Ophir. Punta Arenas was reached on February 11th ; Montevideo and the Azores were visited. Havre roadstead was entered on June 3rd, 1910, and Charcot's Second Expedition was ended. The passage of *Le Pourquoi Pas ?* up the Seine was a triumphal procession, the ship being escorted to Rouen by two torpedo boats sent by Admiral Boué de la Peyrère, the Minister of Marine. All the towns and villages that adorn the banks of the river were decorated in honour of the explorers. Admiral Fournier and other distinguished representatives of the French Government were present at the first or Municipal Reception and Banquet. A still greater ovation followed in Paris. Thus it was evident that the French people knew how to appreciate disinterested scientific work as well as how to celebrate the safe return of their heroic sons.

CHAPTER V

THE SOUTH POLE ATTAINED: AMUNDSEN IN THE *FRAM*

CAPTAIN ROALD AMUNDSEN, undoubted conqueror of the South Pole, was one of the world's greatest pioneer explorers. He was born in 1872 and became a graduate of Oslo University where he took his Bachelor of Arts Degree in 1890. This would have been followed by a medical career had he not found it impossible to resist the call of the wild; so after four years he threw over his studies. In 1894 he went to sea with the definite purpose of training himself to become an explorer, and he pursued his ambition with such unswerving determination that he achieved the most striking success.

In 1897 he made his first voyage to the Antarctic as mate of the *Belgica*. This was one of the earlier scientific expeditions, led by Lieut. de Gerlache of the Belgian Navy. Amundsen, after passing safely through the first Antarctic night, returned with an enriched experience and wrote an Appendix, on the navigation of pack ice, to Dr. Cook's account of the voyage.

Amundsen then proved himself qualified to organize and lead a polar expedition by the results of his voyage in the *Gjoa*, from 1903 to 1906, when he was the first to make the North-west Passage by ship. His methods were modern and to a certain extent scientific. He re-determined the position of the North *Magnetic* Pole and then decided to enter the lists for the North *Geographical* Pole. In the year 1906 Peary had made what he himself, at the time, believed to be his final effort to reach the North Pole, for he was then 50 years of age; and again he had failed.

Amundsen intended to repeat Nansen's drift in the *Fram*, but to enter the Arctic pack farther east than in 1893 and thus, it was hoped, to reach the Pole by a short sledge journey if not in the ship. Great difficulty, however, was met with in raising the money for this venture, for the ship had to be provisioned for a seven years voyage. Then, in 1909, when he was almost within sight of success, both Peary and Cook claimed to have reached the North Pole and it was hopeless for Amundsen to proceed with his original plans. Only one course remained, we are told, to save the expedi-



Photograph from WIDE WORLD PHOTOS]

CAPTAIN ROALD AMUNDSEN

tion ; and that was to make an immediate attempt to reach the South Pole and postpone the original programme. This Amundsen did, working out every detail with such precision that he could venture to predict the exact day on which he would return to his Antarctic Base with the Pole in his pocket !

The whole expedition was organized exclusively for getting to the South Pole and back in safety ; the personnel was selected for no other purpose. Thus the best dog drivers, ski runners and ice pilots that could be found in Norway were taken out, with ninety-seven Eskimo dogs and an ample supply of sledges as the sole means of land transport. Amundsen was the only medical man on the expedition, though his services were never required. Very little scientific work was either proposed or carried out. The Norwegian Government lent the *Fram*—now the most famous of polar ships—and on August 9th, 1910, she set out on her third polar voyage provisioned for two years. A call was made at Madeira on September 6th, where the change of plan was publicly announced and a cable to this effect sent to Captain Scott. A long non-stop run was then made to Antarctica. The first iceberg was sighted on January 1st, 1911, and the next day, in latitude 66° 30' S. and longitude 176° E., the pack was entered. On January 6th, in latitude 70° S. and longitude 180°, the Ross Sea was reached on the south side of the pack and on the 11th the Bay of Whales was seen.¹

Amundsen's genius was evident in his choice of a base. It soon appeared that he was not merely following Shackleton, for on the *Fram's* arrival the bay was full of ice, so she stood off for a day and then, the ice having all gone out, sailed right up to within 2 miles of the place where the hut was soon erected. There was no danger of the station being carried out to sea because Amundsen had found that parts of the Barrier were aground and had not moved for a hundred years. He chose a position on some of this fixed ice and named his station Framheim. The crew unloaded the ship while the nine men of the shore party sledged the materials for the hut, with all stores and equipment, to the selected site. This work was completed and the hut built in a fortnight. On January 27th, 1911, the Shore Party moved into their new home, and on February 3rd Captain Scott's ship, the *Terra Nova*, sailed into the bay carrying Campbell's Party, of which we shall hear again. We must notice now, however, that this party intended

¹ See Chart No. 4.

to establish its base near the Bay of Whales or in King Edward VII Land if the Norwegians had not been there. After the usual exchange of visits the *Terra Nova* returned to Scott's base in McMurdo Sound with the news of Amundsen's arrival.

The first Norwegian Depot Party started off on February 9th and reached latitude 80° S., 99 miles south of Framheim, in 4 days.¹ The course was laid on the meridian of Framheim, or approximately $153^{\circ} 45'$ W., and the surface of the Ross Barrier was found to be so suitable for dog transport that, on their return, the Depot Party reached the station in two days, an average speed of $49\frac{1}{2}$ miles a day. This is one of the best authenticated performances with the dog-sledge on record. The second depot journey began on February 21st with seven sledges and forty-two dogs. Lindstrom the cook, who had been in the *Gjoa* with Amundsen and in the *Fram* with Sverdrup, alone remained behind. This party passed the depot in latitude 80° S., and on March 4th *cached* over a thousand pounds' weight of stores in latitude 81° S. From here three men returned, while the other five pushed on to latitude 82° S. where, on March 7th, they left 1,250 lbs. of provisions. They started back for Framheim on the 9th and arrived on the 20th, having averaged 19.8 miles a day on the return journey. These depots were well marked with bamboos at right-angles to the course.

On the third depot journey 2,200 lbs. of fresh seal meat and 400 lbs. of other stores were taken to the depot in latitude 80° S. By April 10th a total of 7,500 lbs. had been *cached* in the three depots and the longest Antarctic night could be entered with the assurance that a good foundation had been laid for the polar journey after the winter. The most important work carried out during the dark season was the improvement of equipment. The weight of the 12-foot sledges was reduced from 160 to 53 lbs.; they were not shod, as the Barrier surface made this superfluous, and they appeared to give no trouble on the glaciers. An almost ideal equipment for Antarctic transport was finally evolved. Eleven tents were provided for the dogs, and they were fed for the most part on seal meat, of which 120,000 lbs. weight was stored for the winter. Very large boots had to be made for the Polar Party as they each wore six pairs of stockings and by so doing escaped frost-bites.

Framheim was soon buried in snow and a miniature village was excavated in the surrounding drifts, replete with conveniences,

¹ All miles in this chapter are statute miles.

including storerooms, workshops and even a steam bath. The party included skilled workmen in all the trades necessary to the expedition. No detail was omitted, and no theories were allowed to interfere with the best arrangements for their purpose. Wine was taken on three nights a week, and thus the winter was spent in comfort and content. The Bay of Whales was found to be very cold though calm; and when an attempt was made, on September 7th, to start the polar journey, the spring temperatures on the Ross Barrier proved too much for the dogs, possibly also for the men. After several days, when the temperature stepped down to -72°F. , or 104 degrees of frost, the loads were *cached* at the 80° Depot and the party returned to Framheim. This temperature is one of the three or four lowest recorded on an Antarctic journey.

On October 19th the polar journey began when Amundsen, Hanssen, Wisting, Hassel and Bjaaland set out with four sledges and fifty-two picked dogs. The loads were light, for 120 days' stores already lay on the route from latitude 80°S. to latitude 82°S. As the distance to the Pole in an airline was about 800 miles, an average of between 13 and 14 miles a day, apart from deviations, would enable the party to reach their goal and return home on full rations. The 99 miles to the 80° Depot was again accomplished in 4 days, with the men riding on the sledges and a south-easterly to south-westerly blizzard blowing most of the time. Much difficulty was experienced with crevasses. Two days were spent at this depot, feeding the dogs and making up the loads for the south. The loads were still light—880 lbs. for each twelve-dog team—the result of which was that the dogs were able to pull the men on their ski, as well as the sledges, completely across the Barrier to latitude 85°S. , or a distance of 340 miles. Their speed was sometimes as much as 6 miles an hour.

The 81° Depot was reached on October 29th and the 82° Depot on November 3rd to 4th. Two days were spent at each depot and large snow mounds erected. Time appears to have been no object; the important consideration was to make the attainment of the Pole, and a safe return, as certain as possible. Hence the Barrier stage of the journey was relatively uneventful, except for the crossing of some dangerous crevassed areas. There was a large surplus of stores at the first three depots. Latitude 83°S. was reached and land sighted to the south-west on November 8th. Two days later mountains were seen to the south and soon afterwards to the east, which delimited the south-eastern boundary of

the Barrier in about 86° south latitude and 163° west longitude.¹ The sledging surface continued excellent and latitude 84° S. was reached on the 12th. New depots were left at every degree of latitude south of 83° S., though they proved superfluous.

As the landward edge of the Barrier was approached, large undulations on the surface, as much as 300 feet high, were crossed. Land was reached on November 16th in latitude $85^{\circ} 5'$ S. and here Depot 6 was left at a height of 930 feet, or about 800 feet above the Barrier. The first stage of the outward journey had been easily accomplished, but the second or mountain stage presented prodigious difficulties. Forty-two dogs, and provisions for sixty days, were taken on from here; and thirty days' supply, or more than enough to take the party home, was *cached*. Before taking the sledges into the mountains a reconnaissance was made for a distance of $5\frac{1}{2}$ miles from camp, to a height of 2,000 feet. Bare rock was seen on a neighbouring hill that was named Mount Betty, and some geological specimens were taken from it. These were the only rock samples brought back from the polar journey, though Prestrud secured others in King Edward VII Land.

The crossing of the mountains began on November 17th, 1911. Amundsen said: "The first part of the ascent went over sloping snow-covered mountain-sides, in some places rather steep. . . . Further up we met with some short, and very steep glaciers." The terrain, until the polar plateau was reached, seems to have been of a chaotic character that is reflected in the record of the journey over it. A schedule and a section of the route have therefore been prepared, with the hope that these may enable us to follow the Norwegians more clearly.

Schedule No. 2 fails to give an adequate conception of the difficulties encountered on this stage of the journey. A reconnaissance had to be made before each advance of the sledges, in order to find any possible line of progress, and the crevasses brought the alpine rope into use. There was no great glacier extending for many miles southward on this route, like Shackleton's Beardmore, that led him to the plateau. Instead of this, the direction of the Axel Heiberg, their longest glacier, appears to have been in part, at right angles to their course, and they were obliged to follow it in spite of this, for some miles. Their loads had to be dragged up and down steep mountain-sides where, on the rising gradients, it was necessary for as many as twenty dogs to be harnessed to one sledge.

¹ See, however, pages 299, 300.

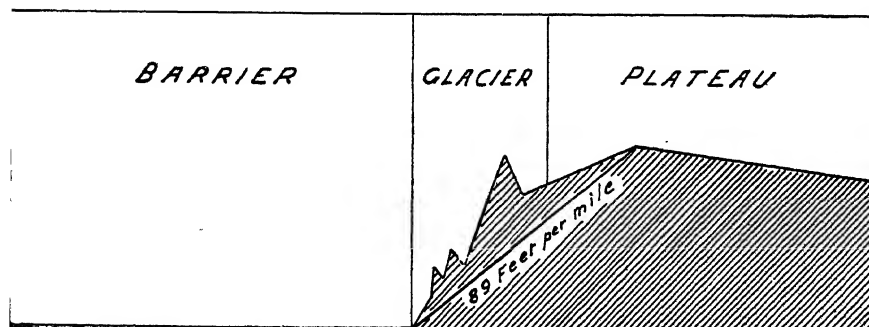
SCHEDULE No. 2

THE MOUNTAIN STAGE OF AMUNDSEN'S JOURNEY

Date	Height ¹	Remarks	Latitude S.	Statute Miles
1911:				
Nov. 17 . .	2,000	First ascent from Depot 6.	85° 5'	11½
" 18 . .	4,000	" "		
" 19 . .	{ 2,000 3,000	First descent, to Axel Heiberg Glacier. } Second ascent, 1,000 feet.		?
" 20 . .	5,500	" "	13 m. on 19th and 20th.	
" 21 . .	5,500	" "		?
" 22 . .	10,600	Second ascent to First Plateau, Butcher's Camp.	85° 36'	19¼
" 23)		At Butcher's. Depot 7. Blizzard.		No
" 24 . .				march.
" 25)				
" 26 . .	10,000	Second descent, in blizzard.		11¾
" 27 . .	9,200	" Mist and snowfall.	86° 0'	18½
" 28 . .	8,000	" Mist. To 6-days' depot.		18½
" 29 . .	8,400	Third ascent. Devil's Glacier. Fog.	86° 21'	?
" 30 . .	8,700	" "		9¼
Dec. 1 . .	?	" " Reconnoitring.		?
" 2)		" "	Obs. 86° 47'	15½
" 3 . .	9,500	" "		2½
" 4 . .	9,800	" Polar Plateau.		25
" 5 . .	10,750	Highest level. Polar Plateau.	87° 51'	25
" 6 . .		" "		?
" 7 . .	c. 10,750	" "	88° 9'	?
" 8 . .	"	" "	88° 16'	

¹ Approximate, in feet above sea level.

CHART No. 6.

**DIAGRAMMATIC SECTION
NORWEGIAN ROUTE**

Nearly the whole of the second day in the mountains the party was in danger from crevasses, and the sledges had to be relayed with double teams. They were rising rapidly but found the heat positively disagreeable. At last the glacier they were ascending became impassable ; it consisted " of nothing but crevasse after crevasse, so huge and ugly that we were forced to conclude," wrote Amundsen, " that our further advance that way was barred." They reached 5,500 feet above the sea, possibly on November 21st, and then had to reconnoitre. Their most direct course, Amundsen said, " was awful. . . . First we had to work our way across a hard, smooth slope which formed an angle of 45 degrees, and ended in a huge, bottomless chasm. It was no pleasure to cross over here." Probably the finest day's work ever done by dogs was on November 22nd, when they pulled the loads 19½ miles and ascended 5,100 feet, or about double the height of Skiddaw above its base. This was a record of which Amundsen was justly proud.

Another day was almost wholly spent on the mountain-sides pioneering a route for the sledges. From the highest point then reached, over 10,000 feet above sea level, they were certain that they saw the polar plateau in the distance, but they were mistaken. As they approached their tent on returning from this reconnaissance the grandeur of the scene almost appalled them : " Chasm after chasm . . . with great blocks of ice scattered promiscuously about, gave one the impression that here nature was too powerful for us," wrote Amundsen. The Norwegians naturally supposed, on attaining the plateau they had seen, that their route to the Pole henceforward would be approximately level, as Shackleton had found King Edward VII Plateau above the Beardmore Glacier, and so they proceeded to slay half their teams. The dog-power had been doubled for the special purpose of the ascent, and twenty-four dogs were killed at Butcher's Camp.

A blizzard kept them here three or four days until they became piqued at the delay. They therefore set off into the driving snow, which seemed to cut their faces like knives and forced them to close their eyes. Few other explorers have ever attempted to travel through such a storm as this, and Amundsen's companions were worthy of the admiration that he bestowed upon them for their hardihood. They pushed on blindly for nearly 12 miles when they stopped because it was evident they were going downhill, which was the last thing they expected. They were actually at that time less than half-way through the difficulties of the

mountains, and had merely arrived at the worst part of their course.

At many other points in their journey, both before and after this, we find the Norwegians jesting about the apparently bottomless chasms they had such close acquaintance with; but not on the Devil's Glacier, as they appropriately named it. They had a wholesome respect for His Majesty. The weather was thick and they were in a labyrinth of yawning crevasses; very often there did not seem anywhere to place their feet in safety. Of course they were roped. On each side of them were mountains rising up to heights of 15,000 feet, and avalanches roared down their sides. More could be heard than seen on their outward journey, for the weather was thick; but on the return a good view was obtained of the Queen Maud Range. His Majesty's final kick at them was in the Devil's Ballroom, as they named an extraordinary surface that was crossed near the edge of the plateau.

The leading dogs went through and hung by their harness. Then, as they were being pulled up, another surface was seen 2 or 3 feet below the outer one and was assumed to be solid until Bjaaland fell. He penetrated the outer crust and was well on his way through the inner one also when he caught a rope attached to his sledge and saved himself. Such was the glacier's farewell. The second and most dangerous stage of the journey was over and the remainder of the route to the Pole was straightforward. Amundsen, it will be noticed, found three similar stages to those of Shackleton—Barrier, Mountain and Plateau.

The Norwegians sledged 25 miles on December 4th, 1911—their first full day on the plateau, where the height was about 10,000 feet. A blizzard blew next day, with very thick snow; but as it was behind them they travelled through it. Again they covered 25 miles, having risen several hundreds of feet. Their daily distances over the plateau varied from 18 to 28 miles; for the surface, on the whole, was good, though patches of sastrugi were crossed. The thick weather did not leave them until December 8th, when they took a solar observation, in latitude $88^{\circ} 16' S.$, which agreed to a mile with the dead reckoning. Next day they passed Shackleton's record south, with a tribute of admiration to the British explorer. Camp was made that day in latitude $88^{\circ} 25' S.$ By then the weather had improved and become more like summer; there was no wind and the temperature had risen to zero Fahrenheit. The air inside the tent was described as sultry.

Their last depot was left here on December 8th and a day's rest indulged in; the self-restraint of the Norwegians is worthy of notice. Depot 9, left here, consisted of 220 lb. of dog food that could be lost without inconvenience. The plateau fell a little in height from latitude $88^{\circ} 25'$ S. to the Pole. On December 9th and 10th observations and dead reckoning agreed to a mile. On the 11th, in latitude $89^{\circ} 15'$ S., observations and reckoning agreed exactly; and next day, in splendid weather with good going, latitude $89^{\circ} 30'$ S. was reached. They had now only 30 geographical miles to go and the sun shone in a calm atmosphere as the Pole drew near. On the 13th the latitude was $89^{\circ} 37'$ S. at the noon observation, and they went on to $89^{\circ} 45'$ S. by dead reckoning before camping.

It was like the eve of some great festival that night in the tent and Amundsen felt as he did when a boy before Christmas. December 14th, 1911, was so fine that it seemed as if the weather had been made for them. At noon they had reached latitude $89^{\circ} 53'$ S. by dead reckoning and—

at three in the afternoon [wrote Amundsen], a simultaneous "Halt" rang out from the drivers. . . . The goal was reached, the journey ended. I cannot say—though I know it would sound more effective—that the object of my life was attained.¹ That would be romancing rather too barefacedly. I had better be honest. . . . The North Pole . . . had attracted me from childhood and here I stood at the South Pole.

The Norwegian flag was hoisted with all due ceremony and the plateau that surrounded the Pole was named King Haakon's Plateau. Shackleton had already named this plateau, at a distance of 97 geographical miles from the Pole, in honour of King Edward VII. In order to make quite sure of including the Pole in their area, three men went out in different radial directions. Each of them risked his life, and incidentally skied over 43 miles that day, for the party had sledged $18\frac{1}{2}$ miles on their last march. Hourly observations of the sun were taken by Amundsen while they were away. Sixteen dogs remained to pull the two sledges back to Framheim; and the three men returned almost simultaneously.

The success of the expedition was celebrated in the tent, especially with tobacco which had hitherto been tabooed. Four of the five men in the party were navigators, so the position of the Pole was well fixed. They stayed there between three and four days, for they had abundance of food, and the sun shone in a clear sky.

¹ This was what Peary said!—J. G. H.

It was nearly midsummer and the average temperature, during the time they were here, was -9° F. The snow plain was exactly what Shackleton had described, so that little had been gained by pressing to the precise point; though the Norwegians did well in breaking such a long, new and dangerous trail. On December 16th the tent was moved $5\frac{1}{2}$ miles "farther south," as a result of the observations; and then twenty-four more hourly observations were taken by four observers with sextant and artificial horizon. From this camp the men went out 4 miles in different directions, and then a small tent was left enclosing two letters; one to Captain Scott, asking him to forward the other note, should the Norwegians meet with an accident, to King Haakon. On December 17th-18th the return was begun, men and dogs having extra rations all the way home; this was truly, as Amundsen said, a great triumph over handsledging.

When the Norwegians started for home the weather was still summerlike and the temperature -2° F. To avoid overworking the dogs it was decided to cover a degree of latitude in four days, or $17\frac{3}{8}$ miles a day. This distance was done in five hours, and the nineteen hours in camp, with the sun much too hot, became almost unbearable. Christmas was celebrated with a mild orgy. On December 26th they passed latitude 88° S. and this day was remarkable for the sighting of the Queen Maud Mountains which appeared, in the clear atmosphere they now enjoyed, to extend indefinitely towards the north-east.

The return journey seemed very pleasant. All the depots were picked up, though all were not needed; limited rations were abandoned and every man and dog ate his fill. The dogs never needed the whip and actually put on flesh. On December 28th the descent from the plateau began; and on the 30th to the 31st, in latitude 87° S., they were passing Scott's Party, toiling towards the Pole, at a distance of about a hundred miles. The Butcher's Camp was reached on January 4th, 1912, during the heat wave; the sun, in latitude $85^{\circ} 36'$ S., was still too hot for comfort. A new arrangement therefore was made: to sledge 15 geographical miles, then rest for six hours and repeat the process. This was done for the remainder of their homeward trip, about 500 miles, and worked out at 34 statute miles one day and 17 miles the next, or an average of $25\frac{1}{2}$ miles a day. They returned to the Ross Barrier on January 6th and had thirty-five days' provisions on the sledges when they left the depot in latitude 85° S. This shows

their usual margin of safety, for only twenty days were spent in re-crossing the Barrier and the food in the other depot was not needed.

During this last stage of the journey there was one important event. This was the discovery of "high bare land . . . and not long after that, two lofty, white summits to the south-east, probably in about 82° S." Amundsen contented himself with marking this on his chart as only an appearance of land, but he believed it to be a continuation of his Carmen Land, as he had named the south-east coast of the Barrier.¹ The existence of land in the vicinity of latitude 82° S., was supported by the disturbed state of the Barrier ice—"crevasses and pressure ridges, waves and valleys." A large store of food was left in the depot at 80° S. which they passed on January 21st; and a message was found there from Lieut. Prestrud, the leader of the Eastern Party, whose fortunes we are about to follow. On January 25th, 1912, Framheim was reached by the Polar Party at 4 a.m. with eleven dogs, all men and dogs in good health. The trip had occupied ninety-nine days—or the explorers would have been back too soon!

The geographical results of this successful raid into the unknown were the further delimitation of the Ross Barrier and the discovery of, perhaps, 400 miles of new mountain ranges, with many glaciers large and small.² The Eastern Party also did some good work under Lieut. K. Prestrud. On November 7th they left Lindstrom again in sole charge of the hut and travelled the 99 miles south to the 80° Depot, which they reached in the usual four days. They then turned due east (true) and followed the eightieth parallel over new ground for another four days without any change being seen in the Barrier surface. On November 15th Prestrud turned to the north and followed the hundred and fifty-third meridian to the coast, running into a mass of sastrugi on the way. This looked like land ice.

A water sky and the presence of some skuas on November 22nd showed they were approaching the coast, and the sea came into view shortly afterwards. The coast was formed of Barrier ice with vertical cliffs a hundred feet high and open water beneath. There was a frozen bay to the east, about 4 miles wide; to this the party descended and a few seals were killed for the larder. A

¹ See pages 299, 300.

² We can only estimate the discoveries very approximately from the Norwegian charts.

sounding here gave 130 fathoms. In the east-north-east a prominent ridge was seen and a course set for it. They steadily ascended every day until November 27th when a plateau, about 1,000 feet above the sea was attained. The next day they reached latitude $77^{\circ} 32'$ S. and were then near the base of the peninsula which terminates to the north in Cape Colbeck. On November 30th the sea again appeared in the north, and two domed summits to the east. These eminences were named Scott's Nunataks in honour of Captain R. F. Scott who had seen them from the *Discovery*.

The nunataks were ascended and found to be 1,700 feet high, falling precipitously on their northern side, with exposures of bare rock; otherwise they were heavily covered with snow. The sea lay about 5 miles to the north, and the "surface descended in terraces towards the edge of the water, where there was quite a low Barrier wall." The Alexandra mountains,¹ also discovered by Scott, were seen in the east, about 1,200 feet high and extending for 20 miles. Biscoe Bay was full of icebergs and the Barrier edge could be discerned. Numerous specimens of rocks were brought away, also some moss that was growing on them. After returning to camp heavy snow began to fall and did not cease for three days; the precipitation was heavier than it had been at Framheim in ten months and the tent was nearly buried. On December 8th it was necessary to return home and they arrived at Framheim on December 15th, after having on the preceding day run short of provisions.

Lieut. Prestrud, in addition to making this journey of about 600 miles, carried out a useful survey of the Bay of Whales and its vicinity, extending in one direction along a frozen channel for 30 miles. On January 15th, 1912, he found the Japanese ship, the *Kainan Maru* in the Bay. The *Fram*, after landing the Shore Party in January, 1911, refitted at Buenos Aires and then carried out oceanographical work in the South Atlantic. Returning to the Bay of Whales at the end of December, some lumps of ice, first met with in latitude 65° S. and longitude 174° E., were all that was seen of the dreaded pack. The southern limit of this ice was passed in latitude 69° S. and longitude 178° E. There was some trouble near the Barrier with a tough snow sludge, and the Bay of Whales was reached on January 9th, 1912, though

¹ These hills must not be confused with the huge Alexandra Range discovered by Shackleton in the Beardmore district.

communication with Framheim could not be established for two days.

By January 29th all the men and the thirty-nine remaining dogs were aboard and the *Fram* bade farewell to the Great Ice Barrier. She anchored in Hobart, Tasmania, on March 7th, where twenty-one of the dogs were presented to Dr. Mawson, whose ship, the *Aurora*, came in while she lay there. The first account of the expedition was sent out from here next day. Tasmania was left on March 20th and Buenos Aires reached on May 25th. Amundsen lingered here and the *Fram* returned home without him. He had made the most successful polar journey in history, having set out from Oslo with a single object in view: to reach the South Pole before any other expedition. To accomplish this purpose he brought the skill of an experienced explorer, skill applied with such prudence and determination that the story of his journey, at least on the Barrier and Plateau, reads like an Alpine holiday. He made it seem as though few things could be easier than a trip to the Pole. In so doing his achievement was assuredly great and is one that will be remembered for all time.

CHAPTER VI

THE IMMORTAL STORY OF SCOTT AND THE SOUTH POLE

THE Antarctic tragedy in which Captain Scott and his companions lost their lives touched the public imagination more than any other similar event had ever done. The terrible Franklin disaster, linked to Antarctica by the ships *Erebus* and *Terror*, occurred before the days of universal education and the diffusion of news, so that even the loss of over a hundred officers and men could not make such a wide or direct appeal as the, fortunately, smaller fatality of 1912.

Scott's death touched the heart of the British people, and through them the whole civilized world, in a singularly significant manner; and to this day hearts are stirred to their depths by its recollection. The story that led up to it is a national epic, set like a magnificent symphony in a minor key, interspersed with movements in the major, and has added to the emotional enrichment of mankind.

Scott was descended from the great Border clan which boasted the renowned Sir Walter as its brightest light. The explorer's ancestors first came into prominence during the eighteenth century, when they were Jacobites; and his great-grandfather spent his life in exile. The fighting services claimed most members of the family for several generations, but the grandson of the exile was delicate and followed a mercantile career in a family brewery at Plymouth. He was the father of the famous Antarctic explorer.

Robert Falcon Scott was born near Devonport on June 6, 1868, and educated, first at Stoke Dameral and later at Stubbington House, Fareham. In 1881 he was entered a Naval Cadet in the *Britannia*, and in 1883 joined the *Boadicea* as a Midshipman. His naval career was distinguished, for the British Navy "was a religion with him"¹; and Sir Clements Markham picked him out as a likely officer to lead an expedition as far back as 1887. It was not until the year 1900 that Scott was promoted to the rank of Commander and appointed to the *Discovery*.

¹ "Captain Scott," Stephen Gwynn, 4.

This successful expedition returned to England before our period, though not, as we have seen, before the heroic era of Antarctic land exploration of which Scott was the pioneer. He discovered, on this expedition, King Edward VII Land and began to unveil the mystery of the great Ross Barrier, travelling over its surface for hundreds of miles, discovering and charting much of its western coastline. Meanwhile, one of the greatest Antarctic discoveries was being made by Captain Armitage, Scott's Second-in-Command, who was the first to see the continental ice of the inland plateau, at a height of 9,000 feet, and who also discovered the great Ferrar Glacier. Scott followed Armitage next year and made another splendid journey, 200 miles in length, over the plateau. In 1906 Scott, then promoted to the rank of Captain, returned to his naval duty with command, first, of the *Victoria*, subsequently of the *Albemarle*. In 1908 he was posted for a few months to the battleship *Essex*, and then transferred to the *Bulwark*, in command of which he remained until March, 1909, when he became Naval Assistant to the Second Sea Lord.

He had been thinking of another Antarctic expedition for a year or two before his Admiralty appointment, but his duties afloat prevented him from developing the idea. With his evenings now at leisure, he worked out a scheme, and on September 13th, 1909, made a public announcement of his project, coupled with an appeal for funds. At the end of the year he left the Admiralty to devote himself exclusively to the new venture. Thus it will be seen that Scott initiated and organized his last expedition entirely on his own responsibility, though he received grants towards its cost from the British and Dominion Governments.

Scott's objects were :

1. To reach the South Pole. 2. The further scientific exploration of the Ross Sea area. Two bases were to be established : one in King Edward VII Land and the other in McMurdo Sound. Which of these would be the main base was to depend on circumstances, but Scott rightly favoured the former.¹

The Royal Geographical Society gave Scott every assistance in its power in order—

to complete the work so well begun by himself, and continued by Mr. Shackleton. . . . So far as the attainment of the South Pole is concerned, it is well known that only about a hundred miles remain to be covered. . . . This

¹ "Geog. Journ.," Oct., 1909 : "South with Scott," Admiral Evans, 2.

spot may not exhibit any features of exceptional scientific interest, and the Royal Geographical Society could hardly advocate an expedition with the South Pole as its sole objective.¹

The Pole was the bait for popular support, but Scott's personal interest lay principally in the scientific work and in this its success was assured.

His scientific staff was the strongest that had gone out, up to that time, to either of the Poles ; though it by no means put the *Nimrod* staff in the shade and was itself exceeded in number by Sir Douglas Mawson's large company of scientists. Dr. E. A. Wilson, who had been with Scott in the *Discovery*, was Chief-of-Staff, zoologist and artist. There were two physicists, of whom Dr. G. C. Simpson, now Director of the British Meteorological Office, was the meteorologist. Two other biologists and three geologists were on the staff, which also included one of the finest photographic artists in the world, Mr. H. G. Ponting. Captain Oates and Mr. Cherry-Garrard each gave £1,000 as well as their services to this notable expedition. The best ship available was the *Terra Nova*, the largest and strongest of the old Scotch whalers. Built in 1884, she had been one of the ships of the Second *Discovery* Relief Expedition, 1904. Scott intended to lay down some large depots on his route to the Pole before the winter, and to this end the *Terra Nova* left London on June 1st, 1910, instead of on August 1st, as originally planned, he himself going out to the Cape in a Mail Boat.

Lieut. Evans (now Rear-Admiral E. R. G. R. Evans, C.B., D.S.O.), who had been in the Antarctic seven years earlier, in the *Morning*, was Second-in-Command of the expedition and Captain of the ship. He took her out to Capetown, which was reached on August 15th and left, under Scott, on September 2nd. Port Phillip (Melbourne) was entered on October 12th, and while there a cable was received by Scott : " Beg leave to inform you proceeding Antarctica. Amundsen." ² Amundsen had been in the Antarctic, in the *Belgica*, years before Scott and would not consider the South Pole British property ; but this would not add to the pleasure of Scott's trip there. Lieut. Evans took the ship on to New Zealand, Scott remaining in Australia to try and raise more money for the expedition. Lyttleton was reached on October 28th, and

¹ "Geog. Journ.," Oct., 1909, 361.

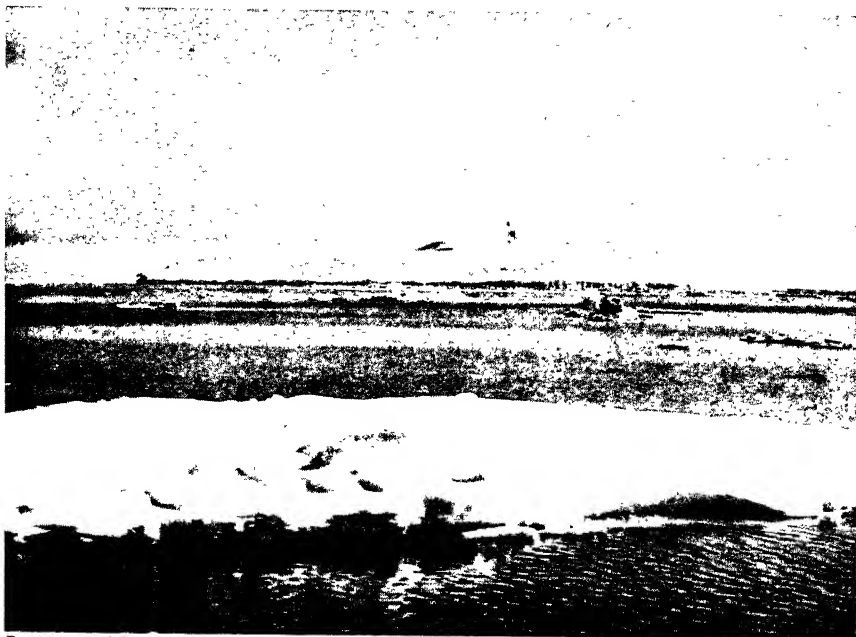
² "South with Scott," 48. Mr. Cherry-Garrard's version of the cable is : "Am going south. Amundsen" ("The Worst Journey in the World," I, 41).

in November Scott's journal begins. This is important as the prime source of information for this chapter, but it is also one of the most humanly powerful documents of its kind ever written.

The *Terra Nova* was completely overhauled and re-stowed at Lyttleton. No fewer than nineteen ponies had to be embarked as well as about thirty dogs and three motor sledges ; for including hand-sledging there were to be four kinds of transport. The ship's one defect was said to be her limited coal-carrying capacity, though about 430 tons were packed somewhere inside her and another 30 tons reposed, for the time, in sacks on deck. Lyttleton was left on November 26th and Port Chalmers on the 29th. Most Antarctic expeditions meet with a gale or two before reaching the ice and the *Terra Nova* was no exception. On December 2nd the wind and sea rose, but the ship was not as fit to cope with heavy weather as she should have been. She was overloaded, as most of these expedition ships are ; she leaked, like all wooden ships in heavy seas, and when the pumps became choked, as they did, there was actual danger of floundering. Ten tons of deck coal was thrown overboard ; two of the ponies died and two dogs were drowned. Lieut. Bowers wrote : " God had shown us the weakness of man's hand and it was enough for the best of us—the people who had been made such a lot of lately." Everyone behaved splendidly and Scott worthily upheld the high traditions of the British Navy.

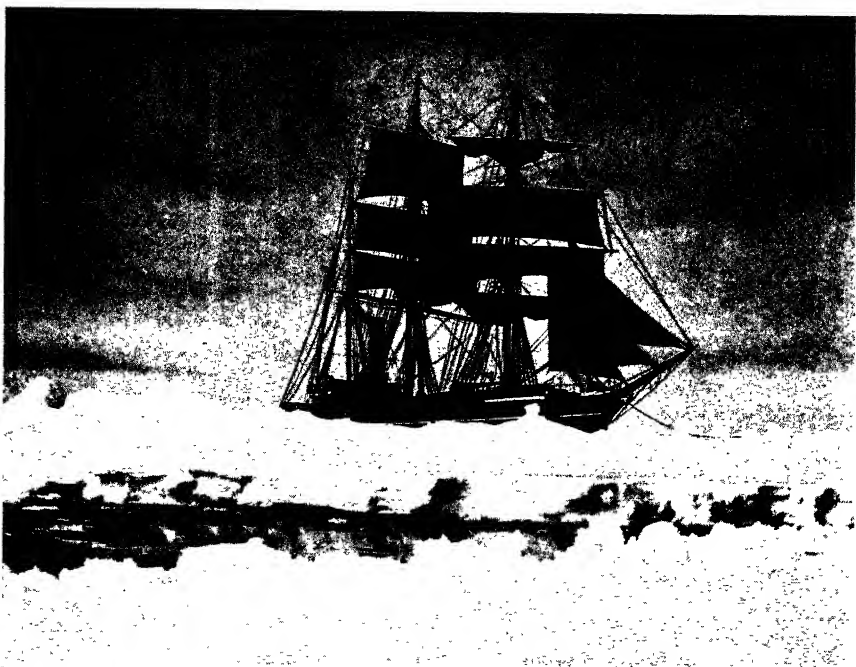
Fortunately the gale did not last more than thirty-six hours ; both the *Nimrod* and *Aurora* endured a week of storms on their outward voyages. On December 3rd Scott wrote : " All is well again." Icebergs were first seen in latitude 62° S. and the pack in latitude $65^{\circ} 8'$ S. and longitude $177^{\circ} 41'$ W. On the 19th a most remarkable berg—if it was a berg—was passed ; it had all the appearance of an ice-capped island. Its position was approximately latitude $67^{\circ} 54'$ S. and longitude $178^{\circ} 28'$ W. The pack was not left behind until December 30th after the ship had struggled through 370 miles of ice in 20 days—an unfortunate delay. Mount Sabine (10,000 feet) was sighted on December 31st from a distance of 110 miles and on January 2nd, 1911, Mount Erebus appeared, 115 miles away. On the 3rd, the *Terra Nova* was off Cape Crozier, where, after receiving Amundsen's cable, Scott hoped to establish his Main Base ; but the swell made it impossible to land there.¹ The following day there was a wide

¹ See Chart No. 4, inset.



By courtesy of H. G. PONTING]

AN ICEBERG THAT LOOKED LIKE AN ISLAND



By courtesy of H. G. PONTING]

THE TERRA NOVA HELD UP IN PACK ICE

choice of wintering places in McMurdo Sound, and Cape Evans was decided upon. This point, 7 miles south of Cape Royds, was named by Scott after his Second-in-Command.

The transport animals and equipment were safely disembarked with the exception of one motor-sledge which broke through the sea ice and still lies at the bottom. There were two other motors and seventeen ponies as well as the dogs. The ship was moored to the edge of the fast ice a mile and a half from where the hut was erected. On January 5th occurred the most remarkable and alarming incident during the unloading of the ship. Scott drew Ponting's attention to some Killer whales, and the latter ran with his camera to the edge of the floe to photograph them. "The next moment," wrote Scott, "the whole floe under him . . . heaved up and split into fragments." A terrible death yawned before the camera-artist, who was threatened by eight whales, the head of one being within two yards of him. He was enveloped in its fishy breath. The whales made a determined attack on him as he leaped from one piece of ice to another. He reached security not a moment too soon and found Captain Scott pale with anxiety on his behalf.¹

Everything was landed from the ship by January 12th, 1911, and the hut finished sufficiently for moving in; this was very quick work and was aided by fine, sunny weather. Scott started on his depot journey and parted from Campbell's party on the 25th. Twelve men with eight ponies and twenty-six dogs formed the large contingent that marched south, in the nick of time, as it happened, for the sea ice broke out the following day and there was no other route. Dr. Taylor with his Geological Party accompanied Scott as far as the *Discovery* hut.

All the stores for the Pole were first collected at a point on the Barrier called Safety Camp, about 2 miles east of the Barrier edge, where it seemed almost impossible for them to be carried out to sea. From here an east-south-easterly course, to avoid the White Island crevasses, was laid for Corner Camp, which was an important point because here the route to the Pole turned sharply to the right, or nearly due south (true). It was 30 geographical or $34\frac{1}{2}$ statute miles from Hut Point.² The Bluff Depot, 54 miles south of Corner Camp and near latitude 79° S., was laid on February 12th, and from here the three weakest ponies were sent

¹ "The Great White South," 64-5.

² All miles in this and the next chapter are statute unless otherwise stated.

back in charge of Lieut. Evans. Scott's main idea was to make a large depot in latitude 80° S., but the remaining ponies were becoming exhausted and two of them at least could not have gone so far. The temperature went down on February 16th to -21° F., with a keen wind that caused some frostbites. A halt was therefore made next day and the depot built.

Particular attention must be called to this depot. It was situated in latitude $79^{\circ} 28\frac{1}{2}'$ S. and near the hundred and seventieth meridian east of Greenwich, or $31\frac{1}{2}$ miles short of its intended position. Its distance was 130 geographical or 149.6 statute miles from Hut Point and about 165 statute miles from Cape Evans. It stood on the Barrier surface out of sight of land except on very clear days; and as a ton of supplies was *cached* there it became known as the One Ton Depot or Camp. On February 18th Scott took Wilson, Cherry-Garrard and Meares, with two dog teams, and made a rapid return, leaving Bowers, Oates and Gran to bring back the ponies at their own pace. Twenty-six miles were covered by the dogs on the first day and 30 miles on the second; on February 20th they travelled 35 miles without having reached their limit. Lieut. Evans was found at Safety Camp on the 22nd with one remaining pony; here Scott received the news that Amundsen had established his station on the Bay of Whales.

The *Terra Nova* had taken Campbell's Party to this bay and then returned to inform Scott of the Norwegians' arrival. Lieut. Campbell, the leader of this party, left at Cape Evans the two ponies allotted to him and then proceeded to Cape Adare for the winter. On February 24th Scott took some more loads of stores out to Corner Camp and reached there on the 26th, missing Bowers, whom he expected to meet with the five ponies. Returning to Safety Camp on the 28th, Scott found Oates and Bowers with all the ponies. Then a third pony died. Bowers was ordered to take the four remaining ponies over the sea ice to Hut Point and the ice broke up as they were crossing. Bowers did not give a thought to his own danger but struggled to save the transport animals until Scott appeared and put a different complexion on the matter, for Scott cared only for the safety of Bowers. Tom Crean had been obliged to jump from one piece of floating ice to another in carrying the S.O.S. to Scott, which the presence of Killer whales made a most alarming feature of the incident. One pony was saved after great adventures, and thus only two were left, out of the eight animals taken on this unfortunate depot journey.

Scott reached Hut Point on March 6th where, when the Geological Party had arrived, sixteen members of the expedition were gathered. No one could leave for about six weeks, until the ice between Hut Point and Cape Evans was safe. On the 16th the last load of stores for the season was sent out to Corner Camp, and when this party returned to Hut Point on the 23rd the temperature was descending to the *minus* forties. Scott hoped to start for Cape Evans on April 10th, but the weather delayed him a day. He took most of his company on the 11th, by a difficult overland route for the first part of the way. They were held up by a blizzard and were fortunate to reach the Main Base without any casualties on the 13th, the Depot Party having then been in the field without a bath or shave for eighty days. One of the ponies left at Cape Evans had had to be shot, hence there were eight at the Main Base and two, for a time, at Hut Point.

Though the sun had disappeared for the winter and the long twilight began to usher in the greater darkness, there was still some coming and going between the two huts. A small party remained at the advanced base to attend to the ponies until May 13th when these animals were brought in. There was very little wine on this expedition, on account of its expense; it was only taken on birthdays and other special occasions. Midwinter Day was celebrated on June 22nd, 1911, with a great banquet at which wine was served and Scott made a speech. This was followed by what Lieut. Evans described as "the greatest treat of all—an exhibition of Ponting's slides." Scott wrote in his journal: "I have never so fully realized his work as on seeing these beautiful pictures; they so easily outclass anything of their kind previously taken in these regions. Our audience cheered vociferously."

The winter passed quite pleasantly because everyone was busy with work that was worth doing. There was no doubt that Scott, as leader of the expedition, "was essentially the driving force" of all the activity. Cherry-Garrard, who affirms this, also says that Scott amazed him "by the amount of work he got through without any apparent effort." He was splendidly supported by his staff and most of all by Dr. E. A. Wilson, who was also a remarkable man. Scott's personnel was excellent, as its achievements show. Three of its members, Wilson, Bowers and Cherry-Garrard, during this winter, made an extraordinary journey to Cape Crozier, returning on August 2nd, as well in health as could be expected after enduring terrible hardships. Preparations for

the polar journey were then begun. More exercise was taken and the ponies were made ready for their work ; none had been lost during the winter or since the disastrous depot journey.

On September 1st the sledging campaign was opened by Meares migrating to Hut Point, followed on the 9th by a small party, under Lieut. Evans, which made the spring journey to Corner Camp. They encountered temperatures of -40° F. with a blizzard and -73° F. without wind. These are very nearly record temperatures on sledge journeys and extremely hard for men to bear ; no wonder they marched 35 miles on the last day to get out of it. Scott started off on September 15th with Bowers, Simpson and Edgar Evans, on a training journey to the Ferrar Glacier on which they averaged $15\frac{1}{2}$ miles a day for the 10 days they were out, pulling an initial load of 180 lbs. a man.

Scott's last week at Cape Evans was filled with the final preparations for his great journey to the Pole. His first object was to transport three units of four men each to the Beardmore Glacier ; then two of them, as Supporting Parties, should be able to assist the Polar Party to within striking distance of the goal. This was carried out to the letter ; but as the greater part of the British route to the Pole has already been traced we can now pass rapidly over the outward journey until the plateau is reached.

From October 24th till November 1st the various parties were getting under way, but the polar journey proper began on November 3rd, 1911, when Scott left Hut Point. He reached Corner Camp on the 5th and One Ton Depot on the 15th. The average speed to this point was about 12 miles a day, afterwards increased to 15 m.p.d. until the expedition was held up by a blizzard lasting from December 3rd to 8th. The Barrier was then very nearly crossed and the last ponies were shot on the 9th. This Barrier section of the journey was comparatively easy ; the hard labour began when the men had to haul their own loads up the Beardmore Glacier.

Scott achieved his primary object in transporting the three units thus far. He also took two dog teams under Meares a few miles up the glacier, sending them back on December 11th ; though these dog teams were not regarded as forming a supporting party. The plateau was reached in three days less than Shackleton had taken, or in twelve instead of fifteen days—such is the advantage of a charted route. Lieut. Evans and Lashly had pulled a sledge from Corner Camp, where the motors broke down, and hence had



By courtesy of H. G. PONTING]

CAPTAIN R. F. SCOTT, R.N., ON THE DECK OF THE *TERRA NOVA*



By courtesy of H. G. PONTING]

CAPTAIN SCOTT WRITING HIS JOURNAL IN WINTER QUARTERS

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toiled for about 400 miles before the other men, who had merely led ponies, began handsledging.

The First Supporting Party was sent back from the Upper Glacier Depot where the height was between 7,000 and 8,000 feet. The two teams that now went forward were led by the First and Second in Command of the expedition—Captain Scott and Lieut. Evans. Scott had Dr. Wilson, Captain Oates and Edgar Evans in his crew; Lieut. Evans had Bowers, Lashly and Crean. They had to pull 190 lbs. a man for 9 hours a day, turning out at 5.45 a.m. and hauling like horses from 7.15 a.m. till 1.0 p.m. and again from 2.30 till 6.30 p.m.

Four diaries kept by these sledgers are extant and they all refer to a subject that may not have appeared of vital importance at the time but which was the beginning of the trouble that ended in disaster for the Polar Party and in an extremely narrow escape for the other team. Lieut. Evans mentioned the matter as early as Christmas, saying that a close observer "would have seen something amiss. The two teams . . . soon lost their springy step, the sledges dragged more slowly."¹ The serious aspect of this difficulty is seen in Scott's Journal, as the following excerpts show:

December 29th, 1911: Height 9,050 about. The worst surface we have struck, very heavy pulling. . . . It will be a strain to keep up distance. . . . Night camp 51: Had another struggle this afternoon. December 30th: A very trying tiring march. . . . We have caught up Shackleton's dates.

Scott's team as well as Evans' was getting worn out between latitudes 87° and 88° S. Their loads were heavy and they had more than a thousand miles to go to the Pole and back to Ross Island.

Lieut. Evans was sent back on January 4th, 1912, from latitude 87° 34' S. when the strongest man, Bowers, was taken from his team and added to the Polar Party. Bowers was undoubtedly the best man to go to the Pole. Lieut.-Commander Geoffrey Rawson, a shipmate of Bowers for seven years, writes:

Bowers was a remarkable man with unusual qualities. His physical endurance was extraordinary; he was very clear headed and had a bright and cheerful nature, a great sense of humour and great powers of mental concentration. He could work in adverse circumstances very quickly and accurately, and he had a neat and orderly mind. His navigation and journals were models of their kind. He was a very efficient officer, a sound seaman and a splendid fellow in a tight

¹ "South with Scott," 200-1.

corner. All these qualities I observed in him when serving with him as a shipmate in various ships before his Antarctic odyssey. He had a very fine character. He was as straight as a die and one sensed deeply religious instincts below the surface. He was one of those rare spirits who exercise a boundless if unknown influence for good wherever he was. I well remember the day he received a telegram telling him of his appointment to the *Terra Nova*. His delight was boundless—it was the realization of his dreams. I called him at four-thirty in the morning he was to sail from England in the Peninsula and Oriental Steamer and my last memory of him is sitting on the gunwale of the launch as he waved good-bye.

When Scott's team went on alone they were 146 geographical miles from the Pole and the first day, January 5th, 1912, was dreadfully tiring. The same complaint was heard next day when Edgar Evans had cut his hand, a little accident that might have serious consequences on the plateau. Scott wrote on the 9th: "Record. Latitude $88^{\circ} 25'$. Height 10,270 feet." Shackleton's record was beaten, but only on the British route, as Amundsen had reached a higher latitude on December 8th. At a distance of 85 miles from the Pole the One-and-a-Half-Degree Depot was left and Scott said it was going to be a stiff pull both ways. On the 11th the pulling seemed as bad as ever and the following day the party was exhausted after only 12 miles. They passed the eighty-ninth parallel on the 13th, so they had then 60 geographical miles farther to go; but they were not, even then, in the state of health and strength necessary for the work before them; they began to feel cold, which was a bad sign. On January 14th there were 40 geographical miles to go and again Scott said they noticed the cold; all their feet were cold, though Oates was the worst. Next day, when they left their last depot, was the fifth consecutive fine day. Then, on the 16th, the blow fell.

They marched $7\frac{1}{2}$ miles before lunch when the latitude was $89^{\circ} 42' S$. As they started off again their spirits were high because they felt confident of reaching their goal next day; but Bowers saw a black speck marring the perfect whiteness of the plain, and soon they found it was a black flag—dire welcome to the Pole! The remains of a camp, with sledge tracks and the marks of many dogs, next were seen. "All the day-dreams must go; it will be a wearisome return," wrote Scott. There was little sleep for them in the tent that night. On January 17th, 1912, they walked on another $7\frac{1}{2}$ miles and took observations. Scott very keenly felt being forestalled, and wrote: "Great God! This is an awful place and terrible enough for us to have laboured to it without

the reward of priority. . . . Now for the run home and a desperate struggle. I wonder if we can do it."

These were ominous words. Scott evidently doubted the ability of his party to reach Cape Evans. Their outward marches had totalled 908 miles and they were not fit to pull the sledge such a distance again. Here the heroic attitude of these men is seen, for they had to fight the equivalent of a protracted rearguard action. More observations were taken on January 18th before turning back; and Amundsen's tent was found with the Norwegian record and two letters, one addressed to Scott and the other to the King of Norway. Scott took these and left his own record in accordance with custom; then the five wayworn men marched 7 miles back in their outward tracks and camped.

Their lives henceforward depended upon the food in the depots, none of which they missed; but they averaged only 13 miles a day during the first week, to the One-and-a-Half-Degree Depot. They felt the cold more than before, Oates worse than the others, except Edgar Evans, who was becoming frostbitten. On January 24th Scott wrote: "Things begin to look a little serious," for a blizzard came on and only half a march could be made. The strain of pulling was as great as ever and the first mention of "scant food" was on this day. Their hunger afterwards increased and is mentioned on several days, though it did not become acute; but their speed increased also, owing partly to a south wind and a sail they rigged up on the sledge. As much as 19 miles were covered on each of two days and the average, from the One-and-a-Half-Degree Depot to the top of the Beardmore Glacier, was between 14 and 15 miles a day.

Before the end of January Scott was apprehensive as to the state of his party, for he and Bowers were the only men who had no ailments and even small troubles on the polar plateau may lead to disaster. Wilson had strained a tendon in his leg; Oates got cold feet, literally though by no means metaphorically; and Edgar Evans was losing heart over his frostbitten hands and was the worst of the party. Bowers' diary begins to get curt at the end of January, which was another sign of what Admiral Evans rightly describes as probably the beginning of the end.

Wilson's leg improved in a few days, but Scott had a bad fall on February 2nd, so there were still three out of the five men injured. Oates' toes were going black from frostbite, but Edgar Evans was very much worse as all his finger-nails were coming off.

They were escaping from the inhospitable plateau, only to contend with the crevasses of the glacier, and by the end of the first week in February were in a serious plight. On the 11th to 13th Shackleton's hazardous experience lower down the glacier was almost repeated when Scott's Party also became trapped among crevasses and ran short of food. The 12th was very critical with one bare meal left, though next day they reached the Middle Glacier Depot. By then, however, Edgar Evans was really ill and on the 16th his mind was failing. The party was again short of food; they were not very strong and Scott said they were feeling rather done. Next day death caught them.

Edgar Evans had a very bad fall and dropped behind the sledge several times. At the lunch halt the others had to go back for him and they found him on his knees with every sign of complete collapse. The sledge was fetched and he was borne into the tent, but by then he was in a comatose state and died quietly of the concussion caused by his fall. The four survivors reached the Barrier as broken men, heroically struggling over the last 400 miles towards safety. It was February 12th when they started on the final stage of their journey and two days later Scott said they were not as fit as they had been. He never admitted, for he may not have realized, that it was the increasing weakness of his party that prevented them from marching faster. It seemed to them that the surface became more and more like sand as their strength slowly oozed away. The medical opinion is that they had scurvy and the diary shows by February 22nd that critical times were ahead.

Their constant refrain until the 26th was the heavy haulage rather than hunger. They felt sure that the friction of the sledge runners continually increased as they went on, and their daily mileage tells the tale. A march of even 11 miles on the 25th cheered them up and Scott wrote: "The first double figures of steady dragging for a long time, but it meant and will mean hard work if we can't get a wind to help us." Events proved that they were weakening. The weather was fine though cold, and they were not fit to endure low temperatures. Complaints of hunger began in the diaries on February 26th and there was the usual critical time before each depot was reached. On the 27th the minimum temperature was -37° F. and next day it went down to -40° F. or 72 degrees of frost endured by dying men on a frozen plain. Yet on they went, showing no weakness of purpose though their bodies were breaking down.

By this time Scott admitted in his diary that his party had little chance of getting through. Thus he wrote on March 2nd: "We are in a *very* queer street since there is no doubt we cannot do the extra marches, and feel the cold horribly." With a strong wind and full sail they had only managed to make $5\frac{1}{2}$ miles the whole day and thought the surface was frightfully sticky. By this time Captain Oates was the most seriously affected, for his feet were badly frostbitten. On March 4th the situation had become hopeless, though none of them showed any outward recognition of this. Pulling with all their strength they only made three-quarters of a mile an hour. The snow had turned to sand, they thought, and Scott said they had little to hope for. The next day was "from bad to worse" in spite of a wind that gave them 5 or 6 extra miles. The shortage of fuel was a terrible factor for men in their condition, especially Oates who was "nearly done," as it meant cold instead of hot food. Too much oil had leaked and evaporated from the tins.

"God help us" was now Scott's cry, for they were cold on the march. The circulation of their blood was impaired and so the end could not long be delayed. On March 6th Oates was unable to pull, but he never complained of the pain his frostbitten feet gave him. March 7th was "a little worse." They were entering the Valley of the Shadow, bravely and without regrets. Scott hoped to reach the next depot, Mount Hooper, 13 miles away; but saw no chance of attaining One Ton Camp, 60 geographical miles farther. There was one bright spot: "We are only kept going by good food," Scott said. They had not the torture of continual hunger to bear.

"Worse and worse" was the first remark in the diary for the 8th. Poor Oates was near his end; yet the Mount Hooper Depot was reached on the 9th. Next day Scott doubted if the others could pull through even if Oates were not delaying them. The soldier, of course, could not help himself; but he was beginning to realize that he was hindering his comrades and next day he asked for advice, which brought up their position as a whole, and it was then discussed, apparently for the first time. The subject was faced calmly and with practical wisdom. Oates was urged to march as long as he could and Scott made Wilson hand over enough opium to each man to secure a painless end, should all hope of reaching safety be lost. Then they set out on their last stretch between the depots, knowing they had little chance of getting to

One Ton Camp, though a march of 8 miles a day would have done it in less than a week.

There is no entry in Scott's Journal for March 13th, when there was a head wind and the minimum temperature was registered by Bowers at -37° F. Scott himself, though one of the best of the party, was now very ill and wrote on the 14th: "It must be near the end, but a pretty merciful end," for they were all deadly cold. Next day, Thursday 15th, Captain Oates said he could not go on and asked to be left in his sleeping-bag. His companions could not agree to this and persuaded him to struggle through a short afternoon march. There was a little more conversation on the subject in the tent that night and Oates was proud to think that his fine regiment, the Inniskilling Dragoons, would be pleased with the bold way in which he met his death.

During the previous winter at Cape Evans there had been a conversation between Oates, Nelson and Ponting as to what a man's duty would be if he broke down on a sledge journey and thus became a burden to his companions. Oates was emphatic that self-sacrifice was the only solution. The others agreed, not dreaming that Oates would be put to the test within a few months and would calmly face his own death as a matter of duty.

He slept that night, and next morning, Friday the 16th, a blizzard was blowing.

He said [wrote Scott], "I am just going outside and may be some time." He went out into the blizzard and we have not seen him since. I take this opportunity of saying that we have stuck to our sick companions to the last. In the case of Edgar Evans . . . Providence mercifully removed him. . . . We knew that poor Oates was walking to his death, but though we tried to dissuade him, we knew it was the act of a brave man and an English gentleman. We all hope to meet the end with a similar spirit, and assuredly the end is not far.

This very gallant gentleman, Captain L. E. G. Oates, hoped thus to save his friends. So died a hero.

*He died as few men get the chance to die,
And such a death is immortality.*

All that was left of them still struggled onward, though the temperature went down to -40° F. at noon. They could only make $3\frac{1}{2}$ miles on Saturday the 17th and $4\frac{1}{2}$ miles the next day, but they faced the situation calmly. One Ton Depot was 21 miles away and Hut Point 164 statute, or 142 geographical, miles. They were "cold on the march now, and at all times except meals," said

Scott; "we are worn out *nearly*. My right foot has gone"; it was frost bitten. Bowers naturally was in better form than his older friends, and one can understand how he and Wilson still spoke of plugging away to Hut Point. But no authority on the subject has yet been heard to say that they could have reached it unaided.

On Monday, March 19th, they had two days' food and one day's ration of fuel left. The temperature was no higher than before, yet they dragged the sledge $5\frac{1}{2}$ miles during the morning, and at lunch Scott wrote: "Amputation is the least I can hope for now, but will the trouble spread? That is the serious question." In spite of this he led his party another $4\frac{1}{2}$ miles that day—a distance, in the circumstances, that must be one of the most wonderful day's marches ever made. And so they came to their last camp.

No entry was made in the Journal next day, and what wonder? They were held up by a blizzard and were very weary. It would have been impossible for them to have kept up the distance they had covered on Monday, 10 miles, perhaps even for one day more.

Scott wrote three or four lines on Wednesday the 21st and a little more on the 22nd, when there was no fuel left and only food for one or two more meals. "Must be near the end," he said; "have decided it shall be natural—we shall march for the depot with or without our effects and die in our tracks."

The snow was drifting up their tent outside and it was better that they should not go out lest their records be lost. So they died like men without fear or complaint, Scott writing, writing, writing, until his pencil fell from his frostbitten fingers. He wrote to Dr. Wilson's wife and Bowers' mother, to Sir J. M. Barrie and Edgar Speyer, Admiral Bridgeman, Admiral Egerton and Admiral Beaumont, to Mr. J. J. Kinsey, to his own mother, wife, brother-in-law and others. Never were such letters written in the world before. He also wrote a long Message to the Public in which he prayed that his dependants and those of his dying companions might be provided for.

On Thursday, March 29th, when he could have had no food for a week, he pencilled his final words: "For God's sake look after our people." He knew he was dying and had previously said that there would be no pain. The lash of the blizzard had never for one moment ceased since the 21st. His last thoughts were of his loved ones and his final appeal was for them. Thus passed a noble and heroic soul.

CHAPTER VII

THE COMPLETED WORK OF THE TERRA NOVA EXPEDITION

WE have now to follow the other events of Captain Scott's last expedition, which may rank lower in popular esteem than his polar journey, but were important enough to justify the whole enterprise ; and first, the return of the subsidiary parties from the journey to the South Pole.

These parties turned back, one after another, leaving Scott to the south of them, and recrossed the Ross Barrier.¹ Two of them, known as Supporting Parties, travelled down the Beardmore Glacier as well. The first party consisted of Meares and a Russian boy with two dog teams who were sent back from latitude $83^{\circ} 35'$ S. They did not make a quick passage, their speed averaging 17 miles a day ; but Hut Point was reached on January 4th, 1912. The length of this journey was about 425 miles.

The First Supporting Party, led by Surgeon-Commander Atkinson, turned back in latitude $85^{\circ} 15'$ S. on December 22nd, 1911. Messrs. C. S. Wright, Cherry-Garrard and seaman Keohane completed this team. Their return was not uneventful, though this was the only party that ever avoided a critical experience on the Beardmore. Their speed averaged 14 m.p.d. and they arrived at Hut Point on January 26th, 1912, the length of their journey having been approximately 560 miles.

The Last Supporting Party, under Lieut. E. R. G. R. Evans, turned back in latitude $87^{\circ} 34'$ S., or 146 geographical (168 statute) miles from the South Pole. As this point was 750 miles from the Main Base the whole distance sledged by this party was at least 1,500 miles, or one of the longest polar journeys ever made without dogs. Shackleton had previously gone about 60 statute miles farther over the plateau. Both the companions of Lieut. Evans, Thomas Crean and William Lashly, had served under Scott in the *Discovery*. When the party turned northward on January 4th, 1912, they knew that unless they could average 17 miles a day over the plateau they would have to go on short rations ; and their difficulties were increased by want of a sledgemeter, which measures

¹ See Chart No. 4.

the distance travelled. They came to no harm through this deficiency in their equipment, but the mental strain on the leader was accentuated until land was sighted on the 9th; though the light was so bad next day that they had no visible point to steer for until the 11th. They reached the Beardmore Glacier without misadventure, then their troubles began.

On January 17th they were lost among crevasses, some of which were very large with narrow ridges between them, and terrible risks of being engulfed were run. When they became exhausted Lieut. Evans went ahead to reconnoitre, exposing himself to great danger, and he admits that he called upon God for help. He found a way of escape, but no food remained when, on the 18th, the depot was reached. Evans then suffered from snow-blindness as a result of removing his goggles among the crevasses and by the time his eyes were recovering a far worse malady befell him. When the party had descended to the Barrier, on January 22nd, he was attacked by scurvy.

He marched on with remarkable pluck, covering as much as 16 miles a day, until the end of the month. Then he became weaker and the daily distance of the party declined, first to 13 and later to 11 miles. One Ton Depot was reached on February 9th. On leaving here, Evans was unable to help with pulling the sledge; and on the 12th he fainted with pain and exhaustion. Lashly and Crean then showed what they could do; they tucked him up comfortably on the sledge and pulled him as far as Corner Camp. Progress naturally was slow, for the strength of these two heroes was then beginning to fail. On February 16th they had to go on half rations, and two days later a crisis occurred; Evans had a collapse and could go no farther.

Then Tom Crean took his life in his hands and set off alone, with a little chocolate and biscuits, to get help from Hut Point. Lashly, meanwhile, nursed Evans so successfully that the patient slightly improved. Crean had about 35 miles to go and it would have been scarcely possible for him to have survived a blizzard. If he had gone under, Evans and Lashly would have been lost. The weather, fortunately, remained fine during the greater part of this splendid effort, though eighteen hours after he set out the air began to get thick, but then he had not far to go, and he reached the hut in an exhausted condition. Dr. Atkinson, who was there, lost no time in attending to Crean nor in starting off with a dog team to the relief of Evans and Lashly. He

arrived at the tent on February 20th and succeeded in saving them.

The rescue of Lieut. Evans was a fine piece of work and the King subsequently recognized the bravery and devotion of Crean and Lashly by decorating them with the Albert Medal. Lieut. Evans was invalided home and completely recovered.

The Northern Party, on their return to Cape Evans from the Bay of Whales, left their two ponies for Scott's use. As this party was the most important on the expedition, next to Scott's Polar Party, its members must now be properly introduced.¹

Lieut. Victor L. A. Campbell, R.N., Chief Officer of the *Terra Nova*, was appointed by Scott to command his Second Base. His party consisted of Dr. G. Murray Levick, Surgeon, R. N., zoologist, photographer and second in command; Raymond E. Priestley, geologist, meteorologist and glaciologist; two petty officers and one bluejacket. They left Cape Evans for the second time on February 11th, 1911, and disembarked on Ridley Beach, Cape Adare, on the 18th to 20th of that month. Here Borchgrevink's expedition, in 1899, made the first wintering on Antarctic soil. His old huts were cleared of snow and used as dwellings until the new station was erected; they afterwards became workshops and store-houses. On March 4th the new building was inhabited and the scientific instruments were set up inside and out. On the 19th, the anemometer registered a wind velocity of 84 miles an hour and then broke. Much more violent gales occurred here than at Cape Evans, the blizzards even bombarding the hut with pebbles from the beach. The gusts reached force 12 on the Beaufort Scale.²

One of the most magnificent views in Antarctica was seen across Robertson Bay, with the Admiralty Range in the background. The highest peaks attain a height of 12,000 feet and mighty glaciers descend to the sea, where they end in vertical ice-cliffs. As the mountains also were precipitous, there remained only the lofty Cape Adare Peninsula for possible explorations beyond the limits of the bay, and the peninsula was found to be impracticable for sledges. Short journeys were made on the sea ice, but this was liable to break up suddenly and drift out of the bay.

¹ See R. E. Priestley's "Antarctic Adventure" for full details of their experiences.

² The Beaufort Scale is given on page 147.

The little community settled down quite comfortably, for they had ample food of good quality, and the winter passed in content except for the hurricanes. On July 29th an excursion of about 20 miles was made to the Duke of York Island, near the head of the bay, and cliffs of 3,000 feet in height were seen near the Newnes Glacier. Geological specimens were collected, but blizzards drove the party back to the hut on August 4th. Other short trips were made and then, on October 4th, a longer journey across the bay over the pack ice was begun.

Camp was made that night in Relay Bay, and the following night near Cape Wood, the temperature then being -28° F. On the 6th, Siren Bay, to the north of Cape Barrow, was reached and a depot left. Next day the party proceeded with one month's provisions and sledged 5 miles before camping. The sea ice was then found to be very thin and the tent was moved to a safer position. On the 8th the men were nearly surrounded by thin and sodden ice which was all the more dangerous because there was no break in the wall of vertical cliffs that formed the coast. Escape was safely made from this treacherous neighbourhood, and it was hoped that they would be able to reach the interior by climbing a glacier; but this was found impossible, for every glacier terminated in vertical ice-cliffs. They were compelled to return, and the hut was reached on October 20th, after vainly exhausting every resource for emerging from Robertson Bay.

The Northern Party, in spite of this restriction, did splendid work. Campbell took the magnetic observations. Levick made a complete study of the social habits of the Adelie penguins, his notes being afterwards published by the British Museum; he also took a complete photographic record of the party's work and environment. Priestley instructed the bluejackets in geology, until the whole party became "an Antarctic Association for the Advancement of Science"; he also, with a little assistance, kept a very full meteorological register with records every two hours during the year. On January 6th, 1912, the *Terra Nova* embarked the six men and landed them at Evans Coves in Terra Nova Bay for six weeks' exploration. Here Professor David's Party had embarked in the *Nimrod*, and here Lieut. Campbell's Party was destined to spend a winter in very different conditions from the previous one at Cape Adare.

When the ship sailed away on January 8th, her commander, Lieut. Pennell, arranged to call again on February 18th, the sea

being then quite open. Campbell had six weeks' sledging rations and, in addition, the following stores, which he *cached*, and a list of which is vital to the story: Biscuits, 270 lbs.; cocoa and chocolate, 60 lbs.; pemmican, 56 lbs.; sugar, 56 lbs.; two cheeses, a few onions and raisins, 14 tins of paraffin and some spare clothing and equipment. The intention was to sledge along the coast to Wood Bay.

Various circumstances prevented this journey from being completed. In the first place the work was pure exploration, as the terrain was quite unknown and too difficult for the distance to be covered in the time available. Then heavy snow fell and made progress slow. In addition to these obstacles, a large amount of surveying and geologizing was required within a few miles of Terra Nova Bay. The Melbourne, Boomerang, Corner and Priestley Glaciers were discovered. Priestley collected an assortment of interesting specimens; he also discovered some living lichens and fossil wood. Most of the party suffered from snow-blindness.

By January 31st, 1912, it was evident that the snow and fog would make Wood Bay impossible of attainment, and the decision was made to examine the moraine of the Priestley Glacier. During the first two days in February some valuable fossils were found here which helped to fix the geological position of the rocks. Tracks were then made for the depot which was reached on February 6th and found to be situated on a little island that they named Inexpressible Island as a small token of their opinion on the weather that prevailed there.

February 18th passed without any signs of the *Terra Nova*, and the ice pack extended seaward to the limit of visibility. Day after day went by with never ceasing blizzards which tore the tents and made the outlook serious. The sledging rations would last until the 27th, but half the depot stores had to be reserved for sledging to Cape Evans if the ship failed to relieve the party. They went on half rations about February 24th and some seals and penguins were killed for food. Until March 15th Campbell thought the ship might possibly arrive; but the ice never let her approach nearer than 25 miles. Before this date he wrote: "The conditions are gradually but surely becoming more unbearable, and we cannot hope for improvement until we are settled in some more permanent home for the winter." The men became weak from want of food, for they had to subsist on two meals a day, at each of which they had one mug of weak seal hoosh, another

of weak cocoa and one biscuit. There were three absolute essentials for wintering: shelter, hot food and some light; all these were improvised.

An igloo or cave was dug in solid ice and lined with snow, the party taking up their abode there on March 18th. This sub-glacial dwelling was 12 feet long and 9 feet wide, but only $5\frac{1}{2}$ feet high, and this caused a very painful "igloo back." The floor was insulated with gravel and dried seaweed; there were outer chambers and two doors in a long entrance passage. Six months of the Antarctic Winter were spent here on approximately half as much food as everyone wanted. Little exercise was possible. A blubber stove was made out of an old oil tin, and sea water used for cooking.

The spirits of these splendid fellows never flagged, though their clothing was much too thin for a polar winter and soon became soaked with seal blubber. These men, like Horace's heroes,

Tempered misfortune with a jest.

They sang all the songs they knew and tried to sing many others that they thought they knew. The meat of six seals which they were able to kill kept life in them but was insufficient for strength or comfort. Most of them suffered from frostbite and dysentery. They were hungry after their shadowy meals, especially as the biscuits had to be stopped from July to September in order to reserve the supply for the journey to Cape Evans.

Morale was perfect throughout all these months of hardship; not a man complained or showed the least ill-temper. Campbell conducted a religious service every Sunday, reading a chapter of the Bible and having as many hymns as they could remember; the *Te Deum* was sung throughout. For 108 days an almost continuous succession of gales raged, so they never ventured outside, except of necessity. The sun set on May 5th and rose again on August 10th. Time seemed to pass more quickly after Midwinter Day, June 22nd, when they had their only satisfying meal. Their luxuries were four sticks of chocolate, twenty raisins and fourteen lumps of sugar per man each week, with one half-bottle of wine between them to drink on Midwinter Day. By the end of July a few more seals had been killed and the worst days were over.

The first result of the carnivorous diet was the formation of crystals of uric acid which caused pain and discomfort. Dr. Levick, as Medical Officer, then took the matter in hand. Throughout the winter he carefully regulated the

proportions of blubber and lean meat for each daily ration, aiming as far as possible at 50 per cent. of each. This adjustment resulted in improved health and may serve as a useful record for explorers who might be similarly placed. Fortunately the Vitamin C in meat is preserved by freezing, so the members of the party were saved from scurvy; and the undoubtedly rich supply of the Vitamins A and D in the seals' blubber and the Vitamin B in the liver must be regarded as a potent factor in the survival of the party through experiences hitherto unrecorded by any former polar expedition, not excepting even those of the party under Lieut. Greely. To the above factors must be added the salt obtained from the sea-water ice, of which we used a proportion in preparing the daily "hoosh." The party felt the lack of the biscuit ration in the want of energy resulting from carbohydrate deficiency, and were distressed by a craving for carbohydrate. One of the party who suffered severely from enteritis never recovered completely in after life, and his premature death a few years ago was probably predisposed in that way. Another of the party was seriously affected, the symptoms arising on the way home and persisting for about a year.¹

The conditions of life in the igloo were unavoidably squalid; for nine months the men neither washed nor changed their clothes. On their departure for Cape Evans the spare clothing was served out. When they started, on September 30th, 1912, progress was naturally slow, for one of the party had to be carried on the sledge part of the way; but their speed increased as they became more physically fit. The depot left by David was picked up at Depot Island; and at Cape Roberts, on October 29th, the castaways came into a land of plenty. Here they were able to indulge in buttered biscuits galore, washed down with thick and sweet cocoa. Another food depot was found at Cape Bernacchi on November 1st, though "by this time biscuits and butter had lost their first charm."

On reaching Butter Point a huge dump of stores was found, also a note from Dr. Atkinson that caused the travellers some alarm as to the fate of Scott's Polar Party. On November 6th, 1912, Hut Point was reached, and another letter received with news of the disaster. The Search Party was then away to the south. Campbell hurried on to Cape Evans where, as originally the third in rank, he assumed Command of the expedition. Good meals soon had their effect on his party, increasing all the weights about 2 stone in the first 6 days at the base. The distance from Evans Coves had been over 260 miles and the whole conduct of the Northern Party was worthy of the highest praise.

Dr. Griffith Taylor has told us how the pundits of Cambridge pushed him "out into the cold" as senior geologist and physio-

¹ Note by Dr. G. Murray Levick.

grapher at Cape Evans.¹ The field-work carried out from here consisted, for the most part, in two scientific sledge journeys: the first to the Ferrar and Koettlitz Glaciers; the second to the Granite Harbour District.

On January 27th, 1911, the *Terra Nova* landed Dr. Taylor's Geological Party, for the former of these journeys, at Butter Point. The Ferrar Glacier was ascended as far as Descent Pass where Armitage first came down to the glacier, and here a depot was left. An ice-divide was then discovered between Knob Head Mountain and the Kukri Hills, thus reducing the length of the Ferrar Glacier proper to about 35 miles. The ice above this divide was found to gravitate towards the Dry Valley, and Scott afterwards named this the Taylor Glacier in honour of its discoverer; it is approximately the same length as the restricted Ferrar Glacier but much wider.

The Dry Valley had been discovered by Scott in 1903, though it had never been visited by scientists until now. The Geological Party spent several days here and made a careful survey and examination of its features, finding another divide at a distance of some 12 miles from the sea. The Ferrar Glacier was then descended, stakes being fixed to ascertain its ratio of movement. On approaching Butter Point, Dr. Taylor and Edgar Evans narrowly escaped being carried out to sea, with or without being devoured by the Killer whales that were breaking the ice to reach them!

The Blue Glacier was crossed on February 15th and the Koettlitz Glacier, 10 miles wide, reached 2 days later. The latter glacier, as the party ascended, was found to be most picturesque, with innumerable and fantastic forms of ice, but terrible for sledging. A depot was left on February 20th, though even with loads thus lightened 2 miles a day was the most that could be made. Mount Lister towered 13,000 feet above them on their right hand as they struggled onwards during the next four days, and the beauty of the glacier in the sunlight helped to cheer them. On February 24th the terminal camp was pitched near Heald Island, 1,000 feet high, which was ascended and on which garnets and other minerals, as well as sponges, were found. The Walcott Glacier was explored and Terminus Mountain, 3,000 feet high, scaled.

The return was begun on March 2nd, and an easier track being found the depot was reached on the 5th. Next day the party started for Hut Point, passing the Dailey Islands; and on the

¹ "With Scott, the Silver Lining," 3.

12th a blizzard began that kept them in their tents for two days. Visibility was reduced to a hundred feet and the camp was too near the Barrier edge for complete safety ; but nothing could be done till 10 a.m. on the 14th when the weather improved, and at 7 p.m. the hut was reached.

On November 18th, 1911, the Second Geological Party left their main depot at Butter Point. This party of four men was also led by Dr. Taylor and their ultimate objective was Granite Harbour. A depot was left at Cape Bernacchi on November 20th and Dunlop Island passed on the 23rd. "Night" marching was adopted on the 24th because of the sun's heat and Cape Roberts reached on the 26th. The headquarters of the party were fixed at a point in Granite Harbour that they named Cape Geology and where they arrived on November 30th. The immediate district was thoroughly explored during the next two months. Cartographical and geological surveys were made, the movement of the Mackay Ice Tongue was measured and Mount Suess ascended.

This mountain was found to be over 3,000 feet high, and a magnificent panorama presented itself from the summit. Stupendous cliffs were seen rising 2,000 feet out of the glaciers. Some lumps of coal were picked out of a moraine but the original deposits were not discovered.

On January 15th, 1912, this party was to have been relieved by the *Terra Nova* from Cape Roberts ; but after waiting until February 5th they began to make their way down the coast over the Wilson Piedmont. Cape Bernacchi was regained on the 8th and Butter Point on the 12th. They were picked up by the ship off the snout of the Blue Glacier on February 14th, 1912, and Dr. Taylor sailed on the *Terra Nova* for home with Lieut. Evans, Dr. Simpson, Mr. Ponting and others, nine in all, who were not remaining for the second winter.

The Journey to Cape Crozier in the darkness of the Antarctic night takes us back to the first winter at Cape Evans. This journey to the Emperor penguin rookery was made by Dr. E. A. Wilson, the leader of the party, Lieut. H. R. Bowers and Mr. Apsley Cherry-Garrard. Emperor penguins hatch their young during the coldest part of the year and it was desirable to obtain their eggs for an examination of the embryo chicks. This journey also offered an opportunity for studying winter conditions on a corner of the Barrier, as well as of testing some sledging rations.

June 22nd, 1911, was Midwinter and darkness was upon the face of the earth when, on the 27th, the three men set out into the night. The distance to Cape Crozier was only 67 miles, but had it been much farther the party might not have survived. Schedule No. 3 gives the bare facts on which we must proceed to comment.

SCHEDULE No. 3

THE WINTER JOURNEY TO CAPE CROZIER

		Temperatures (F.)		Miles
		Maximum	Minimum	
1911:				
June	27.	Left Cape Evans. Wind force 5.	-26°	9 $\frac{3}{4}$
"	28.	Lunch Hut Point. Camp Barrier.	Bar-	
"	29.	Frostbites begin. Clothes get bad.	Hut Point. -26.5° rier. -47°	6. 11
"	30.	Soft snow. Relaying loads.	-50° -56.5°	?
July	1.	"	-55° -66°	3 $\frac{1}{4}$
"	2.	"	-60° -75°	2 $\frac{1}{4}$
"	3.	Escape crevasse in moonlight.	-60° -65.2°	2 $\frac{1}{2}$
"	4.	Snowfall. Gusty wind.	-52° -65°	2 $\frac{1}{2}$
"	5.	Deep snow. Relaying as usual.	-27.5° -65.4°	No march.
"	6.	Fog. RECORD.	-55° -61°	1 $\frac{1}{2}$
"	7.	"	-69° -77.5°	1 $\frac{1}{2}$
"	8.	"	-55.4° -75.8°	1 $\frac{3}{8}$
"	9.	"	-47° -59.8°	2 $\frac{1}{4}$
"	10.	Blizzard. Force 6-8.	-24.5° -36.7°	2
"	11.	" " 5-9.	+7.8° +3.2°	No march.
"	12.	" " 9-10.	+9° -7.6°	"
"	13.	Pass Terror Point. Crevasses.	+2.9° -22.2°	"
"	14.	Wind force 3. Crevasses.	-17.4° -35°	7 $\frac{1}{2}$
"	15.	Reach the Knoll. Wind force 4.	-34.5°	5 $\frac{5}{8}$
"	16.	Building igloo. CAPE CROZIER.	-13° -28.5°	3
"	17.	" " Wind force 3.	-23.3°	
"	18.	" " " " 4-5.	-26.5° -27.3°	
"	19.	First attempt to reach rookery.		
"		Calm to 2.	-30° -37°	
"	20.	Rookery reached. Wind force 4-6.	-28.3°	
"	21.	Move into igloo. " " 5-8.	-20.4° -23.7°	
"	22.	Blizzard. Tent blown away.		
"		Wind force 9-10.		
"	23.	" " " " 11.	-12°	
"	24.	" " " " 9-3.	-15.3°	
"	25.	Return journey begun. Wind		
"		force 4-9.	-15.3° -17°	
"	26.	Crevasses.	-21.5° -45°	4 $\frac{1}{2}$
"	27.	"	-45° -47°	7 $\frac{1}{4}$
"	28.	"	-38° -47.2°	6 $\frac{3}{4}$
"	29.	"	-42° -45.3°	6 $\frac{1}{2}$
"	30.	"	-55.3° -63.2°	7 $\frac{1}{2}$
"	31.	Reach Hut Point. On sea ice.	-27° Bar. -57°	8 $\frac{1}{2}$
Aug.	1.	Leave " "		8
"	2.	Reach Cape Evans.	-27.3° -31°	7

The outward journey was sheer horror to one at least of the sensitive men who made it, and the return was worse—but then they had become callous. The only present survivor of this party, Mr. Cherry-Garrard, wrote: "I for one had come to that point of suffering at which I did not really care if only I could die without much pain."

One of the worst effects of low temperatures on a sledge journey is the freezing of the men's clothes. The moisture of the body forms an armour-casing of ice which must be thawed into water before sleep is possible and which solidifies in half a minute on turning out next morning. When once the clothes are frozen their occupier is fixed for the day and may not be able to move his head.

The intense cold was only the first of the hardships this party had to endure; there was also a large amount of soft and deep snow which made progress extremely slow. On July 1st eight hours' hard work yielded $2\frac{1}{4}$ miles, and on the 5th only $1\frac{1}{2}$ mile—due to the necessity of relaying. Blizzards sometimes prevented even this much advance. The most unusual feature of the journey, however, was the persistence of excessively low temperatures, which appear to be the record for any modern journey in the Arctic or Antarctic; and combined with the darkness, the heavy surface, the wind and the crevasses, might have caused loss of life but for the ample food and the excellent leadership of Dr. Wilson.

Cape Crozier was reached on July 14th after difficulties with crevasses; and the walls of a stone hut were erected on a hill called the Knoll, at a height of 800 feet above the sea. There was very little twilight or moonlight, and the wind on the 18th made it impossible to add the roof. The Knoll was near the penguin rookery but exposed to blizzards. During the short intervals of twilight the Ross Sea could be seen down below, entirely frozen over. On the 19th an attempt was made to reach the rookery.

The party was equipped with ice axes and an alpine rope; but the chaotic character of the route, aided by the bad light, caused a retreat before reaching the penguins. Next day the roof was fixed on the hut and a more determined assault made on the rookery. A different route was taken under the ice-cliffs "by a series of slides and climbs and scrambles . . . in among rock débris and snow drifts and frozen thaw pools, and boulders which have fallen," towards the sea ice. A narrow snow ridge, with crevasses below, was crossed in the twilight, and a hole in an

insurmountable obstacle was wriggled through. They got into an icy pit from which escape was made by step-cutting, and the dim light was failing when they stood on the top of an ice-cliff 12 feet high and saw the penguins beneath them.

Wilson and Bowers slipped down the alpine rope, killed and skinned three birds, secured six eggs, and Wilson rejoined Cherry-Garrard by climbing on Bowers' back; but the cliff overhung and Bowers had some difficulty in rejoining his companions. They then set off in the failing light to retrace their way with their treasures, and two eggs were broken in the scramble. A blizzard began; and when they had gained the shelter of the hut, fine snow blew in and soon covered everything.

The meagre amount of light next day, Friday, July 21st, was spent in packing the outside of the hut with snow. The wind had fallen; but early on the 22nd it arose once more and soon reached force 9-10, carrying away their only tent, pitched opposite the hut door. Nothing could be done outside; Bowers was blown over and refuge had to be taken in the sleeping-bags. The blizzard made light of their labours in packing the walls and soon buried them in drift within the hut. Their future outlook, with no tent, was critical. On Sunday the 23rd the blizzard blew with storm force and the roof went; the rocks also fell from the walls but did no damage. The men were buried under snow in their bags and for forty-eight hours had no food. Wilson and Bowers were heard singing hymns. On the 24th the wind fell to force 3, and when there was light enough they went out to look for the tent which, *mirabile dictu*, was found a quarter of a mile away, scarcely damaged.

The party set off for Cape Evans on the 25th, leaving a depot at the hut. Their sleeping-bags were now in such a dreadful state that it was positive agony to enter them; they had become masses of frozen saturation, and as few hours as possible were spent in them each night. The men's skin got sodden when the bags were thawed by the heat of the body and thus became extremely liable to frostbite. "The days march was bliss compared to the nights rest, and both were awful." Wilson and Cherry-Garrard were conscious of having very little sleep during the return journey, except on the march. They slept as they walked.¹

It was a painful tramp back to Cape Evans, which was reached

¹ "The Worst Journey in the World," I, 295, 298; "Scott's Last Expedition," II, 68.

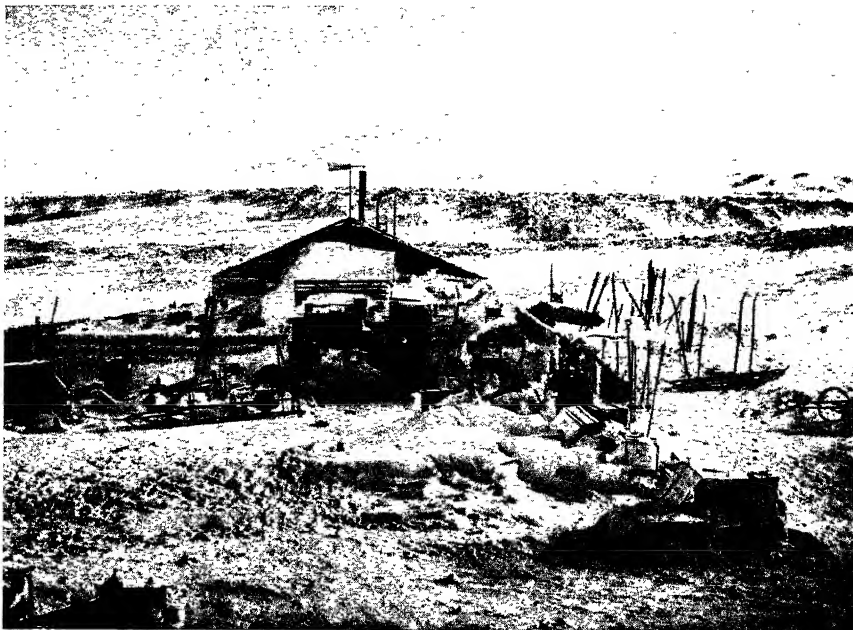
on August 2nd. Bowers was the strongest of the three and never had his feet frostbitten. They all felt that only a divine Providence had saved their lives. Their loss of weight was slight, not more than from 1 lb. to $3\frac{1}{2}$ lbs. a man; but their faces bore the appearance of men who had looked upon death.

The second season at Cape Evans opened with a very sober party of thirteen men who were determined to see the work of the expedition completed as far as possible. Nine of their companions had returned to civilization. Six more, the Northern Party, might well be dead; for they were not equipped for the long winter night, and if alive must be fighting for existence with very heavy odds against them. There was little hope that the ship had picked them up. Five others, including their beloved leader, must be lying dead somewhere to the south of them; and the general opinion of the survivors was that Scott's Party had perished in a crevasse, though Lashly thought they must have had scurvy.

Dr. Atkinson was the leader of the expedition until Lieut. Campbell returned, and the immediate duty of his party was to carry on the scientific work at the base, which they did very thoroughly. The winter was much more stormy than the previous one, and the reduced staff was then faced with a second duty that necessitated a difficult decision: two parties, Scott's and Campbell's, were missing; for which should they search?

Events justified their determination to make the first effort for the recovery of the Polar Party's records. The *Terra Nova*, on her last trip, had brought out seven Indian mules and these pulled the sledges when, on October 30th, 1912, the Search Party left Hut Point. Two dog teams followed on November 1st and caught up the slower transport on the 6th. One Ton Depot was reached on the 11th; and next day, 11 miles south of it, most unexpectedly, Wright thought he saw a cairn. It was half a mile away and he swerved from the course to examine it. A yard of bamboo and some ski sticks were projecting from the Barrier surface, and Scott's tent was near them, half snowed up. It was soon dug out, and all the members of the Search Party identified the bodies.

Dr. Wilson had "died very quietly with his hands folded over his chest." Bowers also was found "in the attitude of sleep, their sleeping-bags closed over their heads as they would naturally close them." Scott was lying between the others; he had opened his bag and his left hand was resting on his old friend Bill. They had



By courtesy of H. G. PONTING]

SCOTT'S WINTER QUARTERS AT CAPE EVANS

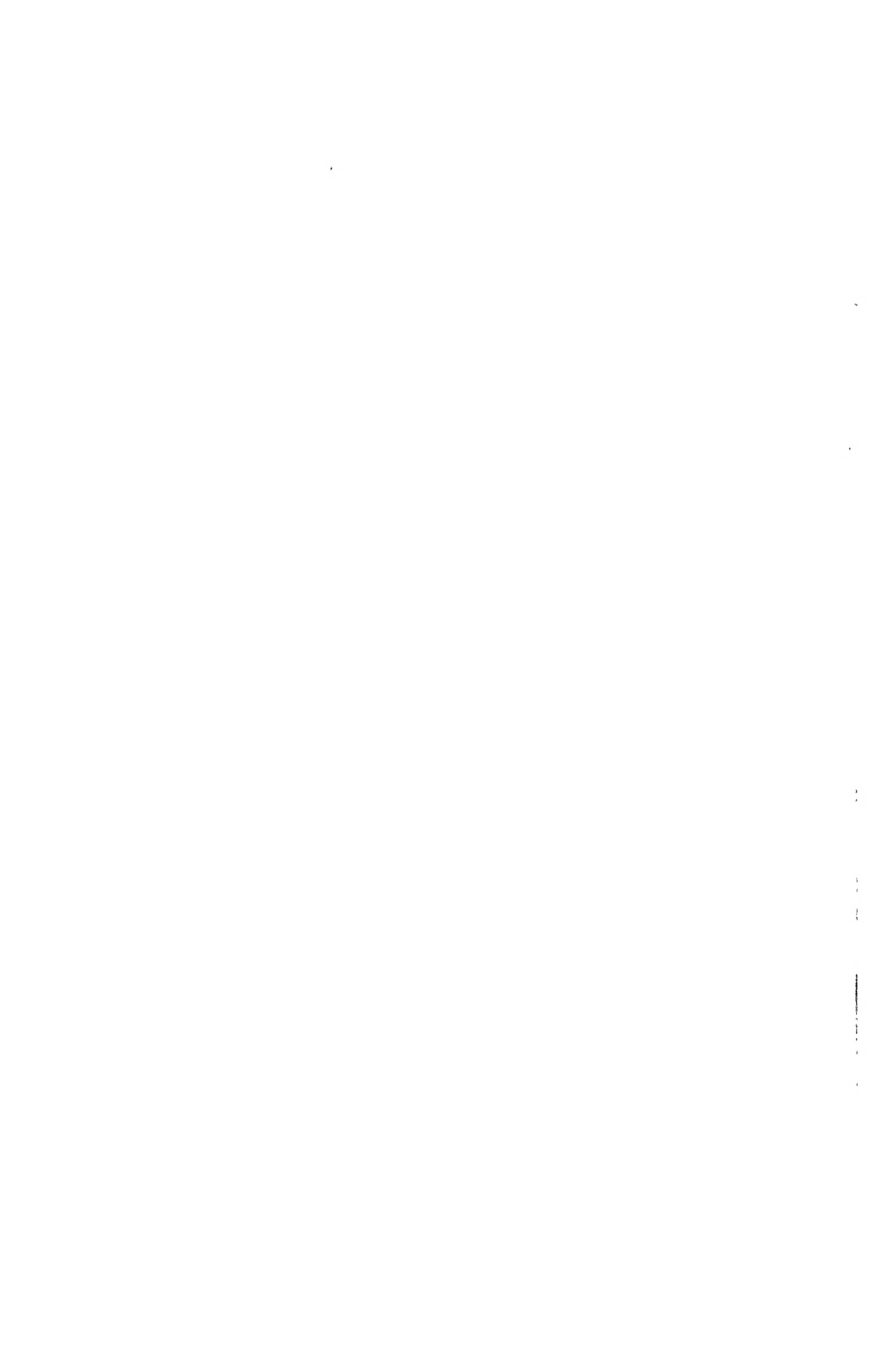
Taken by moonlight during the winter



By courtesy of H. G. PONTING]

NORTH BAY, CAPE EVANS

Showing Scott's winter quarters in middle distance



been faithful to each other unto death. Scott's diaries were under the head of his bag, and close at hand was tobacco. Everything was orderly.

Dr. Atkinson read part of the Burial Service. All the records, letters and gear were reverently removed from the bodies, and no less than 35 lbs. weight of geological specimens from the Beardmore Glacier were found on the sledge, the abandonment of which might almost have saved their lives. The bodies were not moved. A mighty cairn of snow was reared over their tent and surmounted by a cross, with a record, enclosed in a metal cylinder, buried by its side.

On the following day, November 13th, the Search Party continued to the south with the slender hope of finding the mortal remains of Captain Oates. They did find, on an old pony wall, his sleeping-bag, containing his footgear, socks and theodolite. Scott had evidently brought them along in the event of Oates being still alive. The Search Party went 13 miles farther south, to the place where he walked out to his death, but nothing more was seen. Another cairn and record were left here; then the party turned northward with the purpose of rescuing Campbell and his men, or of finding out their fate.

On passing the polar mausoleum of Scott, Wilson and Bowers, the returning party bade them a final farewell. "There alone in their greatness they will lie without change or bodily decay, with the most fitting tomb in the world above them." In about 400 years, when they reach the Barrier Edge, they will be consigned to the deep with a finer salute than could be given by all the guns in the fleet.

Hut Point was reached on November 25th and the good news received that the Northern Party had survived. Both parties joined at Cape Evans next day. The Second Ascent of Mount Erebus was made over a new route by a party under R. E. Priestley on December 2nd to 16th, 1912. Debenham made a plane-table survey as the party ascended and geological specimens were collected. The volcano was too active for the comfort and safety of the climbers but they reached the summit. When they were leaving the crater there was a loud explosion and large blocks of pumice were hurled into the air. In spite of these and the fumes of sulphur they returned to Cape Evans without mishap.

The *Terra Nova*, commanded by Lieut. Pennell, after landing the Northern Party at Cape Adare on February 18th to 19th, 1912,

explored the coast westward of Cape North and discovered Oates Land. This new land was seen to be mountainous, with cliffs on the coast; but its peaks were hidden in clouds and the ice prevented the ship from approaching nearer than 5 miles. The homeward voyage was then continued and Lyttleton, New Zealand, reached on April 1st. Here the ship was overhauled and then, on July 10th, set out on a winter cruise which does not concern us, returning to Lyttleton on October 10th to be loaded for Antarctica.

Her second voyage began on December 15th, 1911, the pack being entered on the 26th to 27th and left on January 1st, 1912. Robertson Bay was full of ice and some difficulty was experienced in embarking Campbell's Party on the 3rd and 4th. After landing this party at Evans Coves on the 8th a long struggle with the pack began. From January 13th to February 4th the *Terra Nova* was in the vicinity of McMurdo Sound but could not reach Cape Evans until February 6th. The unloading of stores continued until the 14th when the Geological Party was picked up and the ship went north in search of Campbell's Party, but she could not approach within many miles of Evans Coves, and after fighting ice and storms returned to Cape Evans on February 25th. Proceeding to Hut Point on the 28th, Lieut. Evans was invalided on board with Dr. Atkinson in attendance and after another call at Cape Evans a second attempt was made to relieve the Northern Party, again without success. As much as 35 miles of pack separated the *Terra Nova* from the marooned men and on March 3rd the ship once more returned to Cape Evans when the remainder of the party embarked for home. The following day Atkinson, and some stores, were landed at Hut Point and then the return voyage was begun.

A third and final attempt was made to reach the Northern Party, but it was now late in the season and the conditions off Terra Nova Bay had, if anything, grown worse, so the homeward voyage was continued. Lyttleton was reached on April 3rd, where the ship was laid up for the winter and overhauled in readiness for her last Antarctic Voyage.

Leaving Lyttleton on December 14th, 1912, the *Terra Nova* entered the pack on the 29th, taking a more easterly course than usual for the purpose of exploration and for the taking of soundings. The result was that over 400 miles of ice had to be passed through and the pack was not cleared until January 16th, 1913. On the

18th Cape Evans was reached and in twenty-four hours everybody and everything was aboard and the expedition finally left its Main Base.

The last tribute was paid to the lost leader on January 20th by erecting a large memorial cross on Observation Hill, near Hut Point. No better site could have been chosen, as it stands nearly a thousand feet above the sea and is visible to the naked eye from a distance of 9 miles. Mr. Ponting's words, written of Vince's memorial, are even more applicable to Scott's Cross, which is 9 feet high :

This far-most symbol of the Christian faith on earth, gleaming golden in the evening sunlight against the leaden southern sky, seemed like some guardian angel at the threshold of the Forbidden Land beyond—reminding those who would venture further that in the midst of life they are in death, yet holding out the hope of Life Eternal. I saw nothing more inspiring in the Great White South—nor have I seen in all the world besides—than that simplest and most sacred of emblems on that snow-clad hill.¹

The cross was erected on January 20th to the 21st and then the Second Geological Party's depot was picked up at Granite Harbour. On the 25th, the Northern Party's depot was retrieved from Terra Nova Bay. Both these depots consisted mainly of geological specimens. Next day the ship steamed away from the shores of Antarctica and reached Lyttleton on February 12th, with flags at half-mast.

Oates Land was the only important geographical discovery made by this expedition, though the Northern Party also added some miles of new land to the map. Scott's second season was to have been devoted to further explorations of the southern and eastern ranges of the Barrier.

Captain Scott's dying appeal met with a more generous response than he could ever have anticipated. It was taken up by the Antarctic Committee, the Royal Geographical Society and the Lord Mayor of London. In addition, two daily newspapers opened funds. We are not aware that any accounts of the Memorial Fund have been published, but it is satisfactory to know that "a large amount was raised in a few months and most liberal provision made for the future of Scott's wife, son, mother, and sisters, and for the dependants of others who perished in the fatal return from the Pole."² Even when all this had been done the surplus was

¹ "The Great White South," 187.

² "The Life of Sir Ernest Shackleton," 190.

large enough to establish the Scott Polar Research Institute at Cambridge, as well as to provide for the publication of the scientific reports on a lavish scale. The cinematographic record of the expedition, which the King expressed the hope that every British boy might see, has also added several thousand pounds to the fund, its total reaching nearly £80,000. Nor was this all, for the Government provided pensions for all concerned.

Captain Scott must have been a man after God's own heart, for his most noble quality was his unselfishness. He had a beautiful character which naturally made his personality attractive and bound his followers to him by the charm of his nature. Although both a sensitive and a modest man, he disciplined himself with such Spartan thoroughness that he became noted for an iron determination and self-reliance. He was, at the same time, impulsive and temperamental, and thus had a varied and interesting character. His mind was finely balanced and quick to absorb knowledge, which, added to his hardy Scots physique, made him a splendid example of *mens sana in corpore sano* and hence an excellent leader of expeditions. He took an appreciative interest in the work of his staff, every member of which was devoted to him.

A life of devotion to duty, latterly of devotion to scientific discovery, was closed by a heroic and glorious death. A man with rare gifts both of head and heart, those gifts were nobly used through life, and were never more prominent than in his last fatal march and in the hour of death.¹

¹ Sir Clements Markham in "The Lands of Silence," 504.

CHAPTER VIII

THE HEAD OF THE WEDDELL SEA: FILCHNER IN THE *DEUTSCHLAND*¹

GERMANY had taken no part in Antarctic exploration since the return of the *Gauss* in 1903 until the publication in 1909 of Dr. Wilhelm Filchner's well-conceived scheme. This not only included the attainment of the Geographical Pole but sought to solve a problem of greater scientific value. It was uncertain whether the Antarctic continent was a single vast land-mass or whether a channel, connecting the two known indentations of the Ross and Weddell Seas, divided it into two smaller portions.

Filchner's original conception was one which Dr. Bruce had suggested. There were to be two ships in wireless communication with each other. The main party was to sail as far south as possible in the little-known Weddell Sea, effect a landing, and set out upon a southern sledge journey. The second ship would enter the Ross Sea and send out a supporting party to meet the others near the Pole.

In spite of support from the Reichstag and the press, the funds necessary to equip this ambitious scheme were not forthcoming, and a modified programme had to be adopted. This, after friendly conversations with Captain Scott and Dr. Bruce, took the form essentially of the Weddell Sea part of the plan only. In this relatively unknown region there were great possibilities, and Filchner aimed at making explorations which should throw light on the relations between East and West Antarctica.

A Norwegian sailing ship, barque-rigged with auxiliary engines, built in 1905 for ice navigation and previously known as the *Bjorn*, was purchased and renamed the *Deutschland*. Captain Richard Vahsel was appointed Master. In addition to officers and crew the personnel included five scientists and two medical doctors; it totalled thirty-five all told.

The expedition sailed from Hamburg on May 3rd, 1911, for Buenos Aires, which was reached on September 7th, a full programme of oceanographical work being carried out on the way.

¹ This is the first extended account of Dr. Filchner's expedition in English.
C.S.P. 129 I

The Manchurian ponies and Greenland dogs of the expedition which had preceded the ship were here taken aboard, with fodder, fuel and much other material. Buenos Aires was granted the rare privilege of seeing two Antarctic expeditionary ships together, for on the 14th of September the *Fram* sailed into the harbour and made fast close to the *Deutschland*.

The *Deutschland* left Buenos Aires on October 4th, 1911, and after an extremely rough passage reached South Georgia on the 21st.¹ A very considerable amount of scientific work was done on this island, while horses and dogs enjoyed a welcome rest ashore. Captain Vahsel, who was suffering from rheumatism, also stopped ashore, as did several of the scientists when, on November 1st, the ship left Grytviken. She was bound on a visit to the little known islands of the South Sandwich group, discovered by Captain Cook in 1775. She encountered a tremendous gale, with hail and snow, a temperature near freezing-point and a wind of force eleven on the Beaufort Scale.² Filchner estimated the height of the waves at 65 feet. On the third day the storm abated to some extent and the island of Lieskow came in sight, though landing was not to be thought of in existing conditions. Some of the other islands were visited in turn, positions were taken and soundings made, but the continued stormy weather prevented a landing anywhere. During the whole of the trip Filchner suffered severely from sea-sickness and was only occasionally able to leave his cabin. The ship returned to Husvik in South Georgia by November 12th, took on 120 tons of coal and returned to Grytviken on the 19th. The Sandwich Island trip had proved an unexpectedly severe test for the men and gave the ship a chance to show her seaworthiness in no uncertain manner ; it had not been altogether barren of results, although scientific work had been hindered by the storms.

Preparations for departure were now pushed forward. Twelve Manchurian ponies were stabled in the bows of the ship on December 3rd, 1911, and the dogs soon followed. An added gift of two oxen, two sheep and two pigs made the ship into a small farmyard. All was finally prepared for the south by December 11th, 1911, when the expedition left the last outpost of civilization at 9 a.m. Observations had shown that the pack ice of the Weddell Sea was less dense to the east, and Filchner's plan was to set a southerly course through the pack until the shores of the continent were

¹ See Chart No. 1.

² See page 147.

reached and then to follow the coastline as far as possible. This programme was carried out. The first belt of pack was encountered three days after leaving South Georgia and at first the *Deutschland* made comparatively rapid progress. By December 17th the pack had become very heavy and navigation increasingly difficult, until January 24th, 1912, when the ice opened suddenly and a much more rapid advance was possible.

The Kaiser's birthday on January 27th, 1912, was noteworthy in that the bottom samples from 1,853 fathoms gave the first evidence of approaching land, and on the next day the ice was much more open. On the 29th a sounding showed the depth to have decreased to 809 fathoms. Weddell's farthest south in latitude $74^{\circ} 15' S.$ was passed that evening; and good progress was made during the following day through open sea with only occasional ice-floes, until at 3 p.m. the welcome announcement, "Land in the south-east," was heard.

This was new land, described by Filchner as presenting a magnificent spectacle. An ice-cliff, about 150 feet high, formed its seaward boundary and behind it the snow-clad continent rose in gentle slopes to a height of nearly 2,000 feet. The trend of the coast, which is clearly a continuation of Coats Land and of Shackleton's later discovery, the Caird Coast, was to the south-south-west. It was named Prinz Regent Luitpold Land and a course was set along the coast in an effort to reach a high south latitude. After two days the ship was brought up by thick ice forming a bay which was named Vahsel Bucht after the captain of the ship. This was in latitude $77^{\circ} 45' S.$ The Barrier here was about 60 feet high and the sea 100 fathoms deep. Filchner named the Barrier the Kaiser Wilhelm Barrier, but his Emperor reciprocated the compliment by desiring that it should be known as the Filchner Shelf and thus it has remained.

These discoveries were of considerable geographical importance. Not only had new land been found but also an extensive ice barrier, comparable to the Nordenskjöld Barrier, and Filchner had come near to achieving his object.

An early landing-party led by Dr. König made the first reconnaissance of the new land. They reached a height of 975 feet on the inland ice, but soon found that the surface made it impossible to land material and convey it inland for any distance. Two attempts were therefore made to take the ship farther west and to find better approaches to the land, but these were unsuccessful.

The Barrier turned north-west and very heavy pack was encountered. It seemed that the ice drifted down the coast of the new land, until the turn of the Barrier edge caused great masses to accumulate. By February 4th, 1912, the ship had returned to its anchorage in the bay.

Vahsel Bay was very similar to the Bay of Whales. The ice-cliffs of Luitpold Land, varying from 26 to 65 feet high, formed its eastern boundary. Behind it, the continental ice extended in a southerly direction as far as could be seen, forming a limit to the Filchner Barrier which is almost afloat. A prominent feature of the bay at this time was a vast tabular berg, a piece of the ice-shelf, upon which it was easy to land. Here it was ultimately determined to build the hut for winter quarters, for all available evidence seemed to show that it was unlikely to move. From here it appeared possible that the intended journeys could be made: one party of four men led by Filchner himself was to follow the junction between the ice-shelf and the land, one party of three was to cross the Barrier as far as its western edge in a south-westerly direction and another party of three was also to travel on the Barrier somewhat to the west of the second party.

The work of landing animals, stores and material on the "Stationseisberg" began on February 9th, 1912, in ideal weather. Although the air temperature was only 22° F., the warmth of the sun burnt perceptibly and the men worked in their shirt-sleeves. On the night of the 10th a blizzard put a stop to the work, but ultimately proved an advantage as it cleared the floes out of the bay and enabled the ship to come closer to the landing-place. The task was almost completed and the hut nearly built by the evening of February 17th. Hopes ran high, but their fulfilment depended on a natural force that had not been sufficiently considered—the spring tide.

After the floes had gone out, the ocean swell was able to reach the Barrier and this, reinforced by the extra height of the tide, resulted in a catastrophe which deprived the expedition of complete success. The morning of Sunday, February 18th, dawned gloriously, but it was heralded by cracks described at first as cannon shots and later as like the firing of a hundred guns together. The Shore Party, utterly exhausted by their labour of building the hut in a week of practically unceasing toil, were roused by the sounds, and immediately "turned upon the other side and went to sleep again." Filchner, aboard ship, was awakened by Vahsel at 6.30

but could not at first grasp the full meaning of his news. A glance at the scene sufficed. Great masses of ice were breaking from the Barrier and slowly drifting north, the largest being estimated at about 18 miles in length. The Station-berg had not moved as yet, though the ice around it was breaking up, and soon it must be isolated or go itself.

The anchor was raised and the engine started to enable the ship to avoid the larger bergs. Captain Vahsel dared not at first approach nearer than 500 yards from the hut, so that the ship's boats were manned and pulling to and fro in alternation began to collect from the landing-place on the berg material which the Shore Party, now roused, sledged down to them with the help of the ponies. All the morning this salvage work went on, until at 2 p.m. the ship was able to venture again to the edge of the berg and receive loads direct. By 8 p.m. much of the laboriously landed stores and wood for the hut was on board again. In the meanwhile the Station-berg had drifted a mile to the north-north-west. When the last pony was re-embarked Vahsel Bay had completely disappeared. In its place was a wider stretch of open water, Duke Ernest Bay, in which two glaciers terminated.

The work of salvage continued on February 19th, until the berg began to move more rapidly. By six o'clock in the evening enough timber had been salvaged to build three small huts. Only a fraction of the stores remained behind, in the company of one of the dogs which had taken to a solitary life as soon as it had landed, and defied all attempts at recapture. A generous supply of dog food was left to accompany it on its long voyage, together with a record of the fact that the expedition had landed on the berg, that all were well and in sight of new land. Icebergs often make long voyages and it was just possible that this record might be seen and picked up by some ship in warmer seas.

A blizzard blew from the south and the *Deutschland* put out of the bay to the greater safety of the open sea. Returning on February 24th, it passed the Station-berg on its way north with its solitary inhabitant, and was able to land depot parties on the continental ice. Some days were spent in building two large depots of stores in the only possible place, about 325 feet above the sea and beyond the crevassed edge. Several nunataks were seen in the distance and Doctors Brennecke and Heim made a short scientific sledge journey for the purposes of a preliminary survey.

Early in March, 1912, ice began to form about the ship, and on

the 3rd of the month Captain Vahsel stated that he dare not remain any longer. The two men still ashore were with some difficulty embarked next day, and the ship's departure was hampered by the thickening of the ice. By the 6th she was securely frozen in and hopes of a return to open water conditions grew ever fainter. On March 15th Filchner wrote: "Our fate is sealed." The floes again broke up and began to drift out of the bay, taking with them the *Deutschland* firmly embedded in the pack.

There now began a steady nine-months' drift through the polar night, in which the *Deutschland*, more fortunate than the *Endurance* three years later, escaped the effects of ice pressure, and being ultimately set free was able to set a course for civilization. The record of this drift forms a striking contrast to the experiences of the *Belgica*, on which the sufferings were considerable. Music, cards and other games helped to keep up the spirits of the men, and good food and exercise maintained their health. There were seals and penguins to be hunted, for a good supply of these meant the invaluable addition of fresh meat to the menu. The floe was well explored, and a convenient spot discovered for winter sports. When the winter night came on, electric light was installed throughout the ship. The ponies and dogs were housed in stables and kennels on the ice. Most of them, thanks to the care with which they were tended, survived the whole expedition. Later they were allowed their freedom and became not only tame, but also firm friends of each other.

The greatest achievement of the drifting in the ice was the sledge journey in search of Morrell's land or New South Greenland. The American Captain Morrell had reported the discovery of land, in 1823, about 40 miles west of the point now reached by the *Deutschland*. Weddell and Ross, the former from a considerable distance, subsequently thought that they could confirm this, but a degree of scepticism had always been associated with it. Filchner on this expedition determined to seize the opportunity of settling the question and he succeeded in definitely showing that New South Greenland does not exist in the position assigned by Morrell. It was a dangerous task to undertake a sledge journey in the middle of the polar winter, over the drifting floes, with no certain knowledge of where the ship was moving during the period of absence, yet it was efficiently done.

The party, consisting of Dr. Filchner, Dr. König as pioneer and Captain Kling as navigator, set off on June 23rd, 1912. They

had two sledges, each drawn by eight dogs, with a tent, and provisions for three weeks. The ice was much broken, which made travel extremely difficult during the first day, and by sunset at 2 p.m. only $3\frac{1}{2}$ miles had been covered. Next morning the party awoke at eight o'clock with iced-up faces and were not ready to start until 11.30 a.m. Their hopes for a better surface were soon disappointed and the distance on the second day was only $2\frac{1}{2}$ miles.

On the morning of the third day the party, thoroughly exhausted by their struggles of the day before, did not awaken until 9 a.m. The march began at 10.30; a much better surface was found and so progress was more rapid. To counteract this a new difficulty appeared—the glycerine in the compass froze and had to be thawed periodically by putting it close to the body. The day's tale was 10 miles. During that night the dogs were heard barking and finally stampeded away into the darkness, startled by a seal that had climbed on to the ice. In the morning they had to be found and driven back to the tent. On this day a good run was made. By 3 p.m. they had covered 15 miles and were over 30 miles from the ship. After pitching camp, Kling set about the task of determining their exact position. The difficulty of this, owing to frostbitten fingers and the condensation of ice upon the instrument, was so great that the observation occupied two hours instead of the usual ten minutes. The position, as ultimately corrected, was $70^{\circ} 27' S.$ and $44^{\circ} 32' W.$

The march of June 27th was along the edge of a lead in the pack. The remaining distance to the reported position of Morrell's Land was soon covered, and with improvised tackle a sounding was made. No bottom was found at 600 fathoms, the length of their line. Filchner therefore believed that Morrell's mistake was attributable to mirage; his own party had on this journey seen many apparent ice-cliff coasts which were due to the same cause.

It was dusk when this work was done and the party returned a short distance, following their old tracks. When these were lost in the darkness, camp was pitched.

The next morning was foggy. The party were anxious to reach the ship, as full moon was due in two days and this meant high tides and probably the cracking of the floes. The march began on the old tracks, but soon the dogs scented another seal, took charge and dashed off nearly a mile with the sledges. This

wasted a precious hour, but by great good fortune the old tracks were picked up again almost at once. A forced march was now made involving the crossing of a lead covered with young ice barely 6 inches thick, and was continued until 8.30 p.m. when 20 miles had been accomplished. Kling knew that his estimate of their position relative to the ship could not be perfectly accurate and went to sleep wondering what the morrow would bring.

At 9 a.m. on the 29th he left the tent and climbing a pressure ridge was almost sure that at a distance of about 9 miles he could see the masts of the ship. He said nothing, and a minute later was joined by Filchner who said: "Is not that our ship?" Kling had cause to congratulate himself on his navigation, for the course he would have made passed within 500 yards of the *Deutschland*. The ice conditions near the ship were so bad that the distance was more than the party could cover that day, and in the evening they were stopped by a wide lead of thin young ice impossible to cross. Their approach had been seen from the ship and a rescue party set out to meet them with a boat, dragged by one of the ponies. The rescuers reached the edge of the lead by nightfall and the two parties could shout to each other in the dark. Next morning the lead had narrowed to 5 yards and in the afternoon the ship was reached.

During this very creditable journey the party had travelled 94 miles in 8 days, about 30 miles of which was due to the drift of the ice. The ship had meanwhile drifted 37 miles in directions varying between north and south-west. The lowest temperature recorded on the journey was -34.6° F. The men had suffered severely from frostbites, and Filchner, who had strained his heart, was obliged to rest for a time after his return.

The routine life in the drifting *Deutschland* was now resumed. On July 13th the lowest temperature of the expedition, -48° F., was recorded only five days before the return of the sun. With the continued northerly drift, its light grew rapidly stronger.

Captain Vahsel's health had for some time given cause for serious concern, and even in the brighter weather he failed to improve. He gradually weakened and died peacefully on August 8th. He was buried next day, close to the Antarctic Circle.

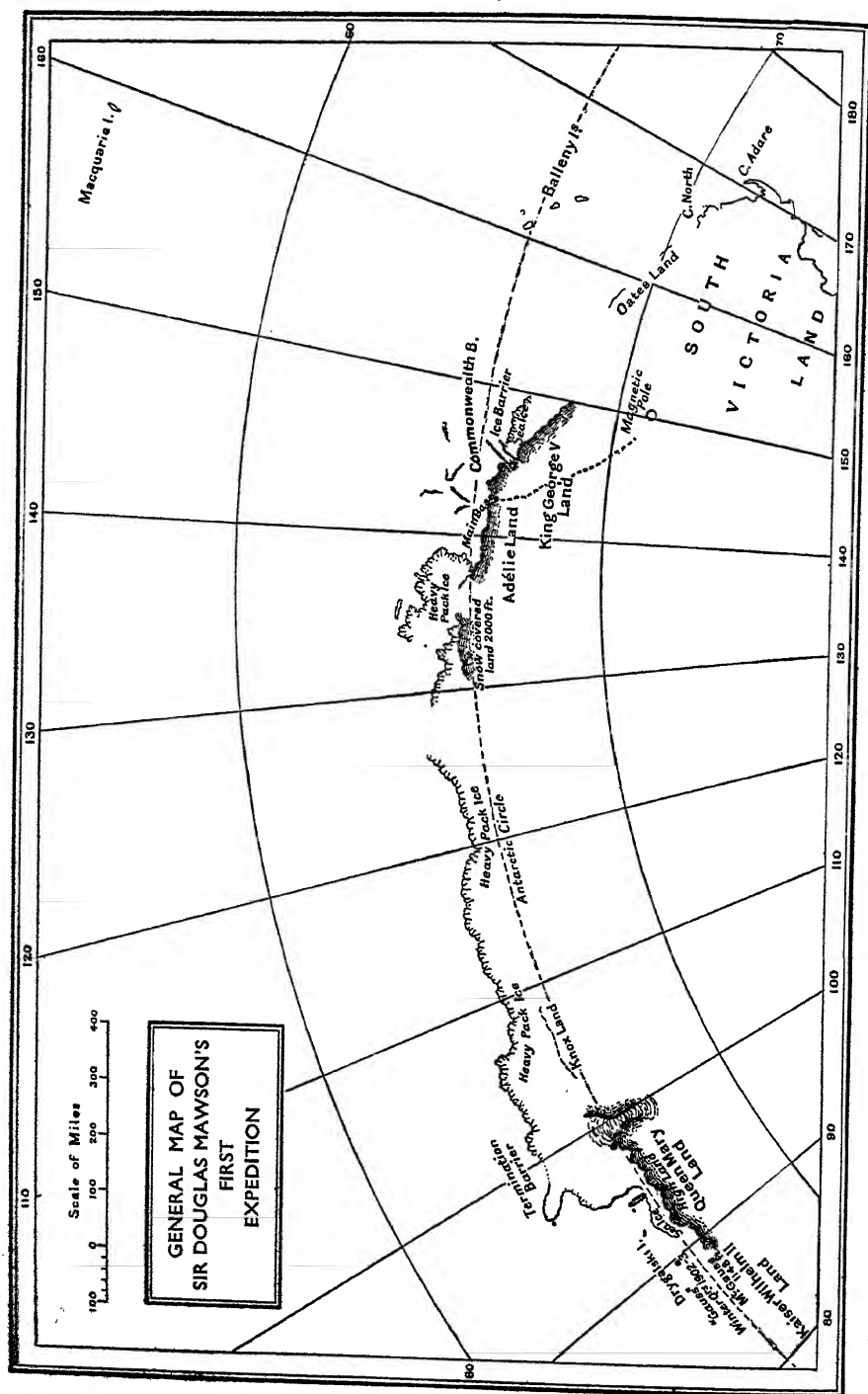
Early in September the movement of the pack became more pronounced. Leads continually formed, closed and formed again near the ship which was often in danger from the pressure set up by these changes. On the 3rd of the month the first of the huts

set up on the floe was dismantled and the equipment brought on board. This work was gradually extended to the other huts as it became advisable.

At last on November 26th, 1912, at 10 a.m. the *Deutschland* moved from her long rest in the ice. Her position was $63^{\circ} 37' S.$ and $36^{\circ} 34' W.$ She had drifted over 10 degrees or 600 geographical miles of latitude in 9 months. Making fair progress through the decaying pack, she finally reached open water on December 16th or two days after the anniversary of her entering the ice. A course was set for South Georgia which was reached three days later.

During the latter part of the drift Filchner had been busy with plans for renewing the efforts of the expedition to carry out the original scheme. There might still be time, he hoped, to refit and sail south again at once, seeking better fortune. He handed over command of the ship to Captain Kling and went quickly to Berlin with this in view, but other counsels prevailed and the Second German Antarctic Expedition came to an end.

CHART No. 7.



CHAPTER IX

THE HOME OF THE BLIZZARD: MAWSON IN THE *AURORA*

GR^{EAT} explorers shine in the Antarctic firmament "as one star differeth from another star in glory." Scott, Shackleton and Amundsen were sailors; Mawson and Charcot are scientists. Of the three British explorers, Shackleton with his magnetic personality, was the great leader; Scott, the sensitive and beautiful character; Sir Douglas Mawson, apart from being an excellent administrator, bears little resemblance to either of his predecessors. Nature was in a generous mood when she made him, as she was when she built Antarctica. The word "strength" comprehensively sums up his character both in mind and body, and he almost suggests an incarnation of the South Polar Continent that he has done more than any other explorer to unveil.

Mawson's family, like Shackleton's, sprang from Yorkshire. Sir Douglas was born at Bradford in 1882 but at an early age proceeded with his parents to Australia. He was educated at Sydney University where he graduated as a Bachelor of Mining Engineering in 1901. He then continued his studies of scientific subjects while acting as a Demonstrator in Chemistry. In 1903 he undertook a geological exploration in the New Hebrides and in 1904 took the additional degree of Bachelor of Science. Next year he joined the staff of Adelaide University, being placed in charge of the Mineralogical and Petrological Departments as lecturer.

Shackleton engaged Mawson's services in 1907 as Physicist to the *Nimrod* Expedition, and in this capacity he carried out many diverse duties including the study of ice-physics and glaciology generally. He wrote the scientific reports on physics, chemistry, mineralogy, meteorological optics, the aurora, magnetism, and the South Magnetic Pole which he had reached and where he observed. His magnetic determinations especially were of great value. He was also one of Shackleton's surveyors and made the first detailed map of the coast of South Victoria Land between McMurdo Sound and Mount Nansen. Thus he won his spurs on the *Nimrod* Expedition.

After his return in 1909 he took his Doctorate in Science and

for a short time had no thought of revisiting Antarctica. The call of the far south, however, began to stir him deeply in the course of a year and he particularly yearned after the 2,000 miles of unknown land that lay between Gaussberg and Cape Adare. In 1910 he discussed his project with Captain Scott who was then organizing his last expedition. Mawson's hope was that Scott, though already involved in two main objectives—reaching the South Pole and exploring King Edward VII Land—might find it possible to land him and several companions on the coast west of Cape Adare with the object of breaking new ground in that direction. Mawson felt that his special scientific knowledge would be largely wasted were he to accompany Scott's Party on the southern trail and over the hundred miles of featureless plateau yet remaining to be traversed before reaching the Pole. Accordingly he did not accept Scott's cordial invitation to join him, with the expectation of being a member of the Polar Party, and so their intercourse proved unfruitful. Mawson was willing to lead an independent command in the region of his choice; but Scott was already too deeply committed elsewhere and could not further extend his plans.

Meanwhile, Mawson's project had begun to develop in other directions. Sir Ernest Shackleton strongly supported it and Mawson wrote: "It was in some measure due to his initiative that I felt impelled eventually to undertake the organization and leadership of an expedition." The Australian Association for the Advancement of Science has the credit of launching this great enterprise, Professors Sir Orme Masson and Sir Edgeworth David being its leading spirits. Shackleton made a powerful appeal for support in the British Isles and the Royal Geographical Society gave its approval and help. The expedition received much influential encouragement at the outset. A sum of over £25,000 was granted by the Australasian Governments; the British Government gave £3,000 and with generous private donations about £46,000 was raised. This did not cover either the cost of the Relief Expedition or the expense (£8,000) of publishing the scientific reports.

Four bases were to be established with three of them on the mainland. This system of linked bases was one of Mawson's innovations, and another was the introduction of wireless telephony into Antarctica. The latter was a bold experiment in 1911, but it was an experiment well worth making. The scientific programme was ambitious and needs some scale wherewith it may be

measured. One such scale was provided by Sir Clements Markham when he wrote that Scott's last expedition was "the most completely equipped expedition for scientific purposes . . . that had ever left these shores." While this was true, Mawson's first expedition was partly contemporary with Scott's last expedition and the former had fifteen professional scientists at the three bases he eventually established, while there were only eight of this class in the two *Terra Nova* Shore Parties. Mawson's men were mainly university students, thirteen of whom were graduates. There were three medical doctors.

Captain John King Davis was Second in Command of the expedition and Master of the *Aurora*, an old sealer that had been acquired for the voyage. Frank Wild had soon forgotten the hardships he endured on the *Nimrod* Expedition and was setting out on his third trip to Antarctica where he was to take charge of the Western Base. The leaders of the sledge parties and others will be mentioned later; but Dr. Xavier Mertz, as a mountaineer, must be introduced to the reader here, also Frank Hurley, a young photographer who was about to receive his baptism of snow.

The *Aurora* was one of the vessels that had gone to the relief of General Greely in 1884 when most of his men perished in Smith Sound. Her hull was heavily built and she carried about 600 tons. There was a small steam engine of 98 horse-power. Captain Davis took her down the Thames on July 27th, 1911, and arrived at Hobart, Tasmania, on November 4th. He had forty-nine Greenland dogs on board; for the first time on a British Antarctic expedition dogs became the principal means of land transport, but the number taken was insufficient. An air-tractor was to be used experimentally, and this, with a motor-launch and three wireless installations necessitated the carriage of about 6,000 gallons of petrol.

The *Toroa*, a small steamer, was chartered for the transport of men and material to the first base on Macquarie Island. It was deemed necessary to have a wireless station between the installations in Australia and Antarctica, and this island was suitable for the purpose, lying 850 miles to the south-south-east of Tasmania. As it is in the sub-Antarctic zone, Mawson's station there will not greatly concern us; but we should notice that the island had not been properly charted or explored until this station was established.

On December 2nd, 1911, the Bishop of Tasmania held an inter-



SIR DOUGLAS MAWSON, O.B.E., F.R.S., D.Sc.

cessory farewell service in Hobart Cathedral. A similar service was held in Sydney Cathedral and the expedition sailed with the good wishes of Their Majesties King George and Queen Alexandra. During the night of December 2nd to 3rd both wind and sea rose to a full gale. The *Aurora* was hove-to and wallowed in mountainous seas which deluged the ship. The storm culminated on the 5th when the bridge was partly carried away, the officer on watch fortunately being on the other half. Captain Davis must have handled the ship in a masterly manner for none of the deck cargo to have been lost. Not until December 8th could a course be set for Macquarie Island.

This island was reached on the 11th and the *Toroa* arrived two days later. The station was landed, with a party of five scientists and technicians. The auxiliary vessel, having discharged her cargo, left for Australia on December 15th; but the *Aurora* was not able to depart until Christmas Day, when she headed south on the hundred and fifty-eighth meridian east of Greenwich. The first iceberg was sighted on December 29th and a few hours later the pack came into view. Mr. Hurley wrote: "Mertz, aloft in the crow's nest, was in high ecstasy, and entertained us and the denizens of the pack by warbling loud yodels. . . . Fleets of crystal gondolas drifted on blue canals."¹

It became necessary to change the course to the west until the pack trended south, when its edge was followed for 20 miles in that more desirable direction. Before long the ice became denser, so again the ship had to be headed to the west until, on January 2nd, 1912, the first sign of new land appeared on an iceberg discoloured with earth.

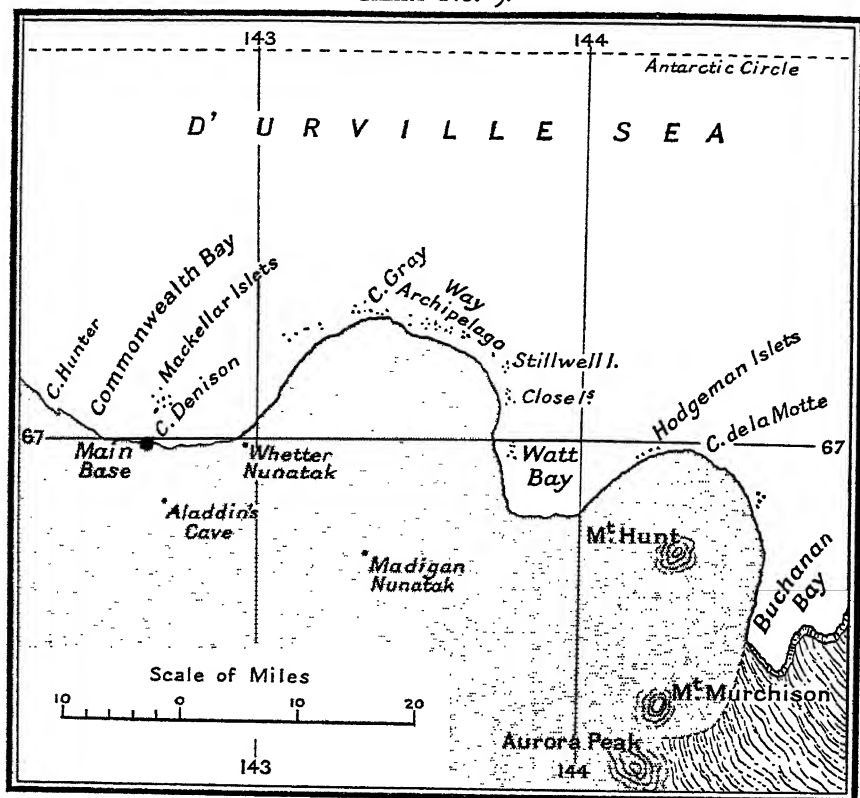
At 5 a.m. on January 4th, 1912, a notable hour in the annals of geographical discovery, a vertical wall of ice was seen and approached. At 7 a.m. it was found to be trending southwards and was followed in that direction. It rose from 30 to 70 feet out of the sea and resembled the edge of the Ross Barrier. This was the second indication that land was being approached, for barrier ice, unless broken off as tabular bergs, is always attached to a coast. The third evidence was that Weddell seals were seen and they are never supposed to wander far from land. Soundings gave the fourth evidence, the depth being only 208 fathoms; and finally, birds became innumerable. The ice-cliff had risen to a height of 200 feet and the land would have been discovered very soon had

¹ "Argonauts of the South," 42.

not a typical Adelie Land Blizzard seized this opportunity of bidding the expedition a welcome to its home.

Everything was blotted out by drifting snow until the afternoon of January 5th when a southerly course was once more set and an ice-cliff seen extending towards the east-south-east. Then fog came on for twenty-four hours, so that nothing could be done

CHART No. 9.



DISTRICT NEAR CAPE DENISON

before the evening of the 6th. A wall of ice 150 feet high was now met with and followed, Mawson wrote, into a bay "10 miles wide, bounded on the east by the shelf ice-wall and on the west by a steep snow-clad promontory rising approximately 2,000 feet."¹

These were momentous discoveries, soon to be succeeded by the finding of rock exposures, as Cape de la Motte was passed on a westerly course out of Buchanan Bay. The new land was part of the Antarctic Continent and presented "a steep, sloping, icy

¹ See Charts Nos. 7, 8, 9.

surface descending from the interior, and terminating abruptly in a seaward ice-cliff 50 to 200 feet in height." Towards midnight on January 6th, 1912, another bay (Watt Bay) was entered and several archipelagos were coasted. The soundings varied from 20 to 200 fathoms and the sea was largely free from pack ice. A third and most magnificent bay then was entered and named, in honour of Australia, Commonwealth Bay.

Great as Mawson's discovery was, he felt disappointed with it. He had hoped to find new mountain coasts like those bordering the Ross Sea; but here, as he said, "was an ice-age in all earnestness," and the whole continent seemed swamped in snow. The open sea that Mawson discovered is also of great geographical interest. It is more navigable than the Ross Sea, as it is much less encumbered with pack ice, though studded with icebergs and islands. It was named the D'Urville Sea in honour of the French explorer who had first seen and named Adelie Land, to the west of Commonwealth Bay, in 1840.¹

As well as could be discerned from the ship, the first base might be established at a point in Commonwealth Bay where a low foreshore appeared, and Mawson considered that the general character of the continental coastline would probably prevent the landing of one of his other parties. He therefore picked seven men under Frank Wild who were to set up one station to the west of Commonwealth Bay, and he combined the smallest of the three prospective parties with his own.

On January 8th Hurley says: "We had come to a fairyland of ethereal blue and silver." The Mackellar Islets appeared, and a mile and a half beyond them, as Mawson and Wild approached in the whale boat, a low rocky cape, named Cape Denison, was found. Here they—

were soon inside a beautiful, miniature harbour completely land-locked. The sun shone gloriously in a blue sky [wrote Mawson] as we stepped ashore on a charming ice-quay—the first to set foot on the Antarctic Continent between Cape Adare and Gaussberg. . . . The rocky area . . . was found to be about 1 mile in length and half a mile in extreme width. Behind it rose the inland ice.

This ice descended from the interior as a huge continental glacier. There was a large terminal moraine between the foot of the ice-slope and the sea. Cape Denison seemed to offer almost an ideal site for the Main Base, in a suitable locality for a scientific

¹ For the history of D'Urville's discovery see "The Siege of the South Pole," 202, 206.

station and with abundant seals and penguins for fresh meat. The debarkation was begun at once and completed by January 19th, 1912, after many interruptions by blizzards. Captain Davis then set out with Wild's Party in the *Aurora* to the west.

The Cape Denison Party consisted of eighteen men with two huts, the larger hut being used as a living-room and the smaller one, joined to it, was the workshop and laboratory. Regular meteorological observations were begun on February 1st and taken every hour afterwards. Two magnetic huts and a transit house were built. The chief engineers, Messrs Hannam and Bickerton, set up the engine and dynamo.

A succession of gales that blew during the first month of residence showed that Adelie Land was a very windy country and would be unfavourable for sledging. The only exploring that could be done at that time was to ascend the ice-slope to the south for 2 miles and erect a flag-pole at the turning-point. On March 1st, Mawson, Bage and Madigan erected another mast 3 miles up the slope and proceeded a further $2\frac{1}{2}$ miles where, at a height of 1,500 feet, the gradient of ascent from the coast became much flatter. The plateau was a featureless plain, scarred by crevasses to east and west. A third pole was set up at this point, $5\frac{1}{2}$ miles south of the station, and the following season this point became the "Clapham Junction" of all sledge routes.

During the whole of the next week there were high winds with much drift, the velocity reaching 80 miles an hour. The precipitation of snow was so heavy that the night watchman sometimes required half an hour to dig his way through the snowdrift on the verandah of the hut; but most of the building was soon buried and thus to some extent protected. Dr. Mawson wrote: "The only indication of settled weather was a more marked regularity in the winds. Nothing like it had been reported from any part of the world." The Beaufort Scale is the accepted classification of wind velocities and is given here as arranged by Sir Douglas Mawson, with the addition necessary to accommodate the Adelie Blizzard. It will be noticed that the pressure exerted by the wind increases more rapidly than its velocity, so that the force of a hurricane is nearly double that of a whole gale and the titanic blows of the Adelie Blizzard are of more than double the destructive power of an ordinary storm. Men were flung about like ninepins until they learnt how to comport themselves. Crampons were the first essential, with spikes about $1\frac{1}{2}$ inch long. The



Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

THE WINTER QUARTERS OF THE AUSTRALASIAN ANTARCTIC EXPEDITION 1911-1914
AT CAPE DENISON

SCHEDULE No. 4

THE BEAUFORT SCALE¹

o.	Scale	Velocities:		Pressures:		Apparent Effect
		Miles per hour	Lbs. per sq. ft.			
	Calm	2	0.02			May cause smoke to move from the vertical.
1.	Light air	4	0.06			Moves the leaves of trees.
2.	Light breeze	7	0.19			Moves small branches of trees and blows up dust.
3.	Gentle breeze	10	0.37			
4.	Moderate breeze	14	0.67			
5.	Fresh breeze	19	1.16			Good sailing breeze and makes white caps.
6.	Strong breeze	25	1.90			
7.	Moderate gale	31	2.81			Sways trees and breaks small branches.
8.	Fresh gale	37	3.87			
9.	Strong gale	44	5.27			Dangerous for sailing vessels.
10.	Whole gale	53	7.40			
11.	Storm	64	10.40			Prostrates exposed trees and frail houses.
12.	Hurricane	77	14.40			
13.	Adelie Blizzard	100-200	From about 23.			Said to prostrate everything.

second essential was to lean against the wind at the correct angle, when some progress could be made by pushing hard enough. Hurley's photographs show men at incredible angles, the head being level with the hips.

This record wind velocity was only one of the dire elements in life at Cape Denison, the second being the drift snow. We read that "In thick drift, one's face inside the funnel of the Burberry helmet became rapidly packed with snow, which, by the warmth of the skin and breath, was changed into a mask of ice"; this looked perfectly ghastly and was difficult to remove without injury to the face. The velocity of the wind exceeded 90 miles an hour several times in April, but this was only the preliminary canter before the winter. On May 11th the average for the 24 hours was 80 m.p.h. and extra struts were put into the roof of the hut. On the 15th the average was 90 m.p.h. for the whole 24 hours; and on May 24th the big guns of the blizzard bombarded the station with gusts having momentary velocities of nearly 200 miles an hour.

¹ See "The Home of the Blizzard," I, 114.

The winter did not pass unhappily within the station despite the chaos outside, for the men were young and resilient. Their average age was only 25 years and they were generously fed. Mawson followed Shackleton in providing more than the bare necessities of life at the wintering stations. He believed that luxuries in moderation had a beneficial psychological effect in counteracting the absence of the usual amenities of civilization.

We need little imagination to understand the difficulty in erecting the wireless masts, 65 feet high, which was begun on April 4th. The work was stopped by the hurricanes of May and June, then resumed in July and August. The aerial was hoisted in a 60-mile gale. On September 1st messages were sent out and continued for a month, though no communications were received. Then came October 13th, known as Black Sunday, when during dinner, with the wind maintaining an hourly average of 91 miles, "one mighty blast was followed by a crack and the sound of a heavy falling body." The northern mast had crashed to the ground and ended the wireless for several months.

There was hope that spring sledging could be started in July; but the temperature went down without any moderation in the wind. On the 29th Lieutenant Ninnis and Dr. Mertz took some sledge loads out a short distance in a hurricane of 70 m.p.h.; at midnight the velocity had increased to 90 m.p.h. On August 10th Mawson, Madigan and Ninnis reached the $5\frac{1}{2}$ -mile post already referred to; and as this was a strategic point for the general advance, a cave was dug within the glacier ice of the surface. Aladdin's Cave was the name given to this ice-cave, which was one of the most useful original features of the whole expedition. The party returned on the 15th. There was no real improvement in the weather until September, which came in with five fine days, the effect of which was magical.

Cape Denison at once resembled a disturbed ants' nest. The geologists and surveyors started their work; a team of men resumed their labours on the wireless masts, and provisions were sledged up to Aladdin's Cave, which was enlarged. The sea froze immediately it was calm and the biologists went out dredging through the ice. About half a mile off shore, in 50 fathoms, the sea floor teemed with life, and numerous seals appeared. Webb and Bage were able to take star observations to check the chronometers. On September 5th several men were out on the sea ice, dredging, when masses of drift were seen over the continental

glacier and a rush was made for the shore. In a few minutes the blizzard reached the station. The dredging party had a narrow escape, for the wind soon attained a velocity of 80 m.p.h. and all the sea ice went north.

Three reconnoitring parties set out in September, the first of them reaching a point $11\frac{3}{4}$ miles south of Cape Denison, where a second cave was excavated in which magnetic observations were taken. This cave was just below the 2,000-foot level on the plateau and was named the Cathedral Grotto. The first sledging-party met with a 50-mile wind in a temperature of -20° F. and were propelled back to the station by "a gusty, 75-mile wind . . . McLean and Stillwell actually skied along on their short blunt crampons." The second party found it impossible to go more than 18 miles on a south-easterly course. On September 13th they accomplished $5\frac{1}{2}$ miles in a 65-mile wind with a clear sky; and on the 15th they lay fully dressed, prepared for the worst, while a hurricane damaged the tent. They thought themselves fortunate to get back alive until they heard Madigan's story. His team was the third of the reconnoitring parties and its members were the heroes of the spring journeys. Schedule No. 5 gives the bare facts of Madigan's reconnaissance.

SCHEDULE No. 5

MADIGAN'S WESTERN RECONNAISSANCE

Date	Wind Velocity : Miles an Hour	Height : Feet	Other Conditions	Miles from Base
1912 :				
Sept. 12.	60 all day . . .	1,500	Temp. -14° F. at Noon.	$5\frac{1}{2}$
" 13.	. . . . .	2,000	Sewing up rents in tent.	—
" 14.	30	2,500	Only "calm" day of trip.	20
" 15.	75 all day . . .	3,000	Thick drift, men exhausted.	25
" 16.	. . . . .	4,000	Madigan's eye frostbitten.	?
" 17.	. . . . .	4,500	" " closed up.	40
" 18.	. . . . .		Lowest temp. on trip, -35° F.	45
" 19.	. . . . .		Depot made and flagged.	50
" 20.	80 for 36 hours		Fears for tent. Dense drift.	0
" 21.	50		Return journey begun.	50
" 22.	75	c. 4,500		?
" 23.	"Quieter" . . .	c. 3,500	Sledgemeter broke down.	?
" 24.	80	c. 2,500	Tent ruined. No drift.	25
" 25.	35	1,500	Reach Aladdin's Cave.	19
" 26.	. . . . .		Return to Cape Denison.	$5\frac{1}{2}$

This party struggled with a loaded sledge on September 15th, 1912, in a hurricane, at 3,000 feet above the sea, with driving snow

in their faces. The blizzard blew, moreover, at right-angles to their course and 5 miles of this torment exhausted them. As they went on they became frostbitten and the tips of their fingers were as hard and devoid of sensation as wood. When 50 miles from the security of the station the party was threatened with the destruction of their tent. They hourly expected it would be torn to ribbons by the terrific force of the wind; and had this happened then there would have been little hope for the whole party. The tent lasted until they were within 13 miles of Aladdin's Cave, on the return journey, and then an 80-mile-an-hour hurricane split the material from top to bottom. It was hopelessly ruined and the men had to reach the cave or perish. Fortunately the wind fell to 35 m.p.h. and they arrived at the cave in safety, though worn out and frostbitten.¹

No sledging could be attempted in October as the wind average for the month was 56.9 m.p.h. A few enterprising seals adventured out of the water but they soon returned to their more congenial element. The *Aurora* was due in January, 1913, to embark the Cape Denison Party for home. It was necessary, therefore, to start sledging in November if journeys of any considerable length were to be made. With the conditions so adverse it was evident that progress in the field would be slower than in the other parts of Antarctica hitherto visited. There were two main problems to be solved, the one geographical and the other magnetic; and detailed scientific researches were also to be carried out by all the sledge-parties as well as by the staff at the station. Magnetic observations in the Magnetic Polar Area and along its approaches from the north were of prime importance. To carry out this and other work the following parties left Cape Denison in November, 1912. They are mentioned in the order in which we shall deal with them:

¹ Sir Douglas Mawson writes: "You refer to the tent used by Madigan's Party. In properly assessing the effect of these hurricane winds upon the Antarctic tents, you should realize that the light drill tents used by Scott and Shackleton in the Ross Sea region would not last any time in an Adelie hurricane. We had taken south with us some of the drill tents as used by Scott and Shackleton, but had also taken the precaution to include in our equipment a number made of japara sail cloth of enormously greater strength and heavier weight. These were the tents used in Adelie Land. Even japara sail cloth made up in the same pattern as the Scott-Shackleton tents would not last long in such winds. By dint of necessity, we finally devised an improved type for use under very windy conditions."

1. THE EASTERN COASTAL PARTY, under C. T. Madigan, B.Sc. Rhodes Scholar, to map and investigate the coastline beyond the Mertz Glacier.

2. THE NEAR-EASTERN PARTY, led by F. L. Stillwell, B.Sc., geologist, to chart and investigate the interesting coast between the station and the Mertz Glacier Tongue ; also to act as supporting party to the other eastern teams.

3. THE SOUTHERN OR MAGNETIC POLAR PARTY, in charge of Lieutenant R. Bage, R.E. (Austral.), B.E., whose journey would be made entirely over the plateau towards the interior of the continent.

4. THE WESTERN PARTY, in charge of F. H. Bickerton, which was to extend the exploration of the coastal highlands visited by Madigan in the spring and to experiment with the air-tractor sledge.

5. THE FAR-EASTERN PARTY, under Dr. Mawson, whose intention was to push rapidly with the dogs eastward over the northern slopes of the plateau, his course lying between the routes of the Eastern Coastal Party and of the Southern Party, though nearer to the former. He naturally expected to reach much farther than would be possible for Madigan.

In addition to these five exploratory parties, Bage's team was allotted a supporting party to assist as far as possible, consistent with returning to the station by the end of November. Three-men units were the invariable rule, and all except Mawson's were hand-sledgers because of the shortage of dogs. It was impossible for any of the parties to leave the shelter of the hut until November 8th when Madigan's and Stillwell's teams pulled their sledges up to Aladdin's Cave. Here they were detained by a 55-mile wind on the 9th ; but they set off next day on a south-easterly course that rose a hundred feet in each mile.¹ Many crevasses, from 1 foot to 200 feet in width were encountered. A blizzard that worked itself up to 80 m.p.h. then prevented progress until November 16th when Mawson's Party was met, by appointment, 18 miles from Cape Denison, at a height of 2,500 feet. The combined parties spent a very happy evening, now a revered memory for all but two of those young explorers. Madigan says : " We were nearly all university graduates. We knew that this would be our last evening together ; and Dr. Mertz sang the old German student song : *Stadio auf einer Reis.*"

Mawson then handed his final instructions to Madigan who,

¹ All miles on this expedition are statute unless otherwise stated.

when the parties separated, descended into the depression of the Mertz Glacier and discovered the first nunatak, named Mt. Murchinson (1,860 feet). On November 19th Stillwell's Party branched off to the north, and a glorious view of the sea was obtained, with the mighty glacier tongue extending far over the horizon. A second nunatak, named Aurora Peak (1,750 feet), was then seen and climbed by Madigan's Party. It consisted of gneiss, with bands of schist, while mosses and lichens were plentiful on some of the stones. A depot was left near here and then the crossing of the glacier began. This was 30 miles in width on the route followed and terribly crevassed. Madigan had a fall of 24 feet down one of these huge fissures and noticed that the blue ice darkened to black in its unseen depths.

On November 26th, when the eastern side of the ice tongue was reached, the sea ice was seen extending indefinitely to the north and east; while to the south, about 15 miles away, the coast appeared trending towards the south-east. The pack ice was sledged over for a week on an easterly course, and then another glacier tongue confronted the party. This tongue was reached on December 2nd and was subsequently named in honour of Lieutenant Ninnis. Another depot was left near the edge of the Ninnis Ice Tongue, crossed on a north-easterly course, though the coast receded still farther to the south-east. This was because the charts were based on Wilkes' mythical landfalls which were disproved by this party.

For the second time (on December 5th) the sea appeared from the eastern wall of a glacier tongue, but now the party was 70 miles from land. "Unfolded to the horizon was a plain of pack ice thickly studded with bergs and intersected by black leads of open water. In the north-east was a patch of open sea." During the next four or five days a blizzard raged, which threatened danger for Madigan's Party, as the ice tongue on which they were encamped might have calved and carried them out to sea. Even the pack ice to the south-east, however, withstood the gale, and over it they marched for a week, being favoured with three days of beautiful sunny weather. Areas of "soft, sticky slush" had to be crossed and ponds of open water were seen. Worst of all, wrote Madigan: "some of the tide-cracks," probably at the junction of the pack with the ice tongue, "had opened widely and, when a blizzard blew on December 13th, the thought was a skeleton in my brain-cupboard."

On December 17th a high rocky cape was seen 15 miles to the south and named Horn Bluff. Thirty miles to the east of it a more prominent headland jutted out to the north. This was named Cape Freshfield and marked the eastern limit of their survey. At a distance of 270 miles from Cape Denison, in latitude $68^{\circ} 18' S.$, and longitude $150^{\circ} 12' E.$, the party turned back, after the usual series of angles and magnetic observations had been taken. A south-westerly course was then laid for Horn Bluff which they reached the following day, December 20th.

An interesting discovery was made here, Horn Bluff being found to consist of columnar rocks resembling those of the Giant's Causeway, but on a much grander scale. The party entered the shade of these mighty cliffs when a mile away from them; and afterwards found that their summit was uplifted 1,000 feet above the sea. Madigan wrote :

Awed and amazed, we beheld the lone vastness of it all and were mute. Rising out of the flat wilderness over which we had travelled was a mammoth vertical barrier of rock rearing its head to the skies above. The whole for 5 miles was one magnificent series of organ-pipes. The deep shade was heightened by the icy glare beyond it. Here was indeed a Cathedral of Nature.

On reaching the Organ Pipe Cliffs a scree slope, 200 feet high, was first ascended, at the top of which were several white beacons of sandstone that were part of a large sedimentary deposit underlying the dolerite of the columns and containing also gravel, shale and a poor quality of coal. Fossilized plant remains were gathered from the sandstone; lichens, algæ and mosses were also collected. The cliffs were followed for 4 miles.

The return journey was marked by two other outstanding events. Of these the first was the discovery and exploration of Penguin Point, an impressive buttress of granite, 300 feet high, between the Mertz and Ninnis Glacier Tongues. This granite extended as a massive wall for hundreds of yards along the coast. Some "tiny insect-like mites," and indeed a perfect menagerie of life, existed in this district. Seals, Adelie penguins, skuas and Cape pigeons, with Wilson, Snowy and Silver-grey petrel's eggs, which had never before been found.

The other important event that occurred before this journey ended was the re-crossing of the Mertz Glacier in a blizzard, during which the party was in great danger. Madigan had 8 falls into crevasses in 4 miles. It became impossible to move the sledge through the deep snow, and yet it still fell so heavily that the men

nearly lost their way. No food remained when they were forced to camp 3 miles from their last depot. In this extremity, Madigan nobly risked his life by going on alone, in an attempt to bring supplies to his companions. For seven hours he struggled through the snow, often plunging up to his thighs and climbing a height of 1,200 feet to where the food had been *cached*. He was nearly exhausted when he arrived at the depot and had to tunnel through snowdrifts to break his long fast. The party had eaten only one mug of penguin broth in the previous three days. All danger now was over and Aladdin's Cave was safely reached on January 15th.

The NEAR-EASTERN PARTY left Madigan's team on November 19th and diverged towards a dome-shaped mountain in the north-east which was named Mt. Hunt. A valley 1,500 feet deep was crossed, and the highest point on the northern side proved to be a promontory from which a wide seascape was seen. After bearings had been taken, the party moved to Madigan's Nunatak. This peak was found to be 2,400 feet above sea level and about 300 feet above the plateau. The party returned to Cape Denison on November 27th and set out again on December 9th to make a detailed survey of the district. Its most important part lay between Commonwealth and Watt Bays. The Way Archipelago was seen to contain hundreds of islets, the haunt of innumerable birds. On January 5th, 1913, the party finally returned to the station.

SCHEDULE No. 6

BAGE'S JOURNEY TO THE MAGNETIC POLE

Date	Height in Ft. ab. Sea	Wind Vel: M.p.h.	Notes	Distance: M.p.d.
1912:				
Nov. 10	. 1,900	45	To Cathedral Grotto.	11½
„ 11	. 2,250	70-80	Drifting all day.	2¼
„ 12	. 2,250		Blizzard. Held up.	0
„ 13	. 2,800	35	Light drift. All exhausted.	5½
„ 14	. 2,800	70-85	Blizzard. Held up.	0
„ 15	. 2,800		„ „	0
„ 16	. 3,200		Depot. Snow. Wind light.	5
„ 17	. 3,400		Strong S. breeze. Sun. Obs.	6
„ 18	. 3,650		Enter Mertz Depression. Sun too hot.	12
„ 19	. 2,550		Mertz Depression. Dip 88° 44'.	11
„ 20	. 2,450		„ „	10
„ 21	. 2,250	35	67-mile Depot. Obs.	4
„ 22	. 2,150	70	Held up. Supporting Party returned.	0
„ 23	. 2,150	60	„ Magnetic disturbance.	0
„ 24	. 2,150	50	Many sastrugi. Dip 88° 20'.	8¾

Date	Height in Ft. ab. Sea	Wind Vel: M.p.h.	Notes	Distance: M.p.d.
1912:				
Nov. 25	2,450	65	Travelled half-day.	7½
" 26	2,800		" A steady breeze."	12
" 27	2,900	60	Hard day. Exhausted.	4½
" 28	2,925	50	Held up. Light bad. Obs. <i>Dip 88° 54'.</i>	0
" 29	2,950	40	Head wind. Lat. 68° 32' S.	8
" 30	3,250	60	" Nearly played out " against wind.	4
Dec. 1	3,600		" A good day."	10
" 2	4,150		Large mounds and escarpment seen.	9
" 3	4,400		Deep valley discovered. <i>Dip 88° 30'.</i>	10
" 4	4,500		Fine day but rough surface.	12
" 5	4,550		Fine day. Snow at night.	10
" 6	4,500		Held up. Bad light. Soft snow.	2½
" 7	4,500	60	" <i>Dip 89° 09'.</i>	0
" 8	4,500	60	" Declination quick run.	0
" 9	4,500	60	" " "	0
" 10	4,700		" Hard going."	7
" 11	4,800		Much piecrust.	8½
" 12	4,850		Last Depot in 69° 33' S., 140° 20' E.	9½
" 13	4,850		(Prob. making dep. and obs.) <i>Dip 89° 06'.</i>	?
" 14	5,050		Stiff Southerly breeze.	3½
" 15	5,250		Piecrust very bad. <i>Dip 89° 11'.</i>	12
" 16	5,350	15	" Glorious day. Better surface."	14
" 17	5,500		Lat. 70° passed. <i>Dip 89° 25'.</i>	14
" 18	5,550		Min. temp. -21° F. Max. 3° F.	14
" 19	5,550		Calm. Sun. Heat wave, 105° F. <i>Dip 89° 35'.</i>	13
" 20	5,850	30	Calm. Sun.	15
" 21	5,900	30	Obs. 301 miles from station. <i>Dip 89° 43'.</i>	2½
" 22		20	Return begun from lat. 70° 36' S., long. 148° 10' E.	20
" 23			" A good deal of drift."	20½
" 24			Stopped for obs.	14
" 25			Wind and sastrugi diagonal to course.	18½
" 26		30		12
" 27		35	Last depot reached. Obs. 69° 33' S.	9
" 28-9			Record for handsledging in 24 hours.	41½
" 30			South wind. Obs.	12
" 31			Snowing.	15
1913:				
Jan. 1			Wind fresher. Bage snowblind and rode.	20
" 2			Wind South. " "	12
" 3			Obs. agreed with D.R.	10
" 4			Party on half-rations, as reserve.	11
" 5			Searching for depot.	0
" 6			" "	0
" 7			" "	0
" 8			Dash for station begun.	27
" 9		60		27
" 10			Reached Aladdin's Cave.	13
" 11			Reached Cape Denison.	5

THE SOUTHERN PARTY, led by Lieutenant Bage, bade farewell to Dr. Mawson's team at Aladdin's Cave on November 10th, 1912, and proceeded to the Cathedral Grotto where the Supporting Party awaited them. Messrs. Webb, magnetician, and Hurley, photographer, completed this unit. If reference is made to Schedule No. 6 nearly all mention of the atmospheric conditions under which this party travelled can be here omitted. Bage had been given a choice of destinations and decided to aim for the Magnetic Pole in preference to striking geographically south towards the interior.

For the first week, until November 18th, there was a steady rise in the continental slope to a height of 3,650 feet. The surface then consisted partly of hard and smooth patches like polished marble and partly of "a jumbled mass of small, hard sastrugi." On November 19th the party entered the huge depression of the Mertz Glacier which occupied a fortnight in crossing, descending 1,500 feet on the northern side and emerging, finally, on to a higher slope to the south. Then the sastrugi gradually died out and the surface became smooth. A curious cup-shaped hollow, 2 miles wide and 150 feet deep, was found some distance within the depression. Meteorological observations were taken continually, and the readings of the Dip Circle evoked much interest.

The heat within the Mertz Depression was almost insupportable, for the sun temperature was 116° F. and the spirit-bulb thermometer registered "40 degrees below freezing-point in the shade." The air in the valley seemed inert and enervating. On November 21st the first depot was left near the bottom of the basin and was known as the 67-mile Depot. It should have been left a hundred miles from the station but the party was behind its schedule. This depot should be remembered until its position is reached on the return journey. From here the Supporting Party returned.

On the south-eastern slope of the Mertz Depression the snow surface became rougher than ever. Bage noticed on November 26th that his party was emerging from the valley and he could see its northern ridge, 40 miles away. To the north-east a dip in the skyline showed the course of the Depression where crossed by Mawson's Party. As the Southern Party approached the more open plateau its surface appeared old and pitted. Névé began to appear, often split into small crevasses. The physical history of the region is engraved upon its surface. Some large crevasses

were seen at a height of 3,400 feet on December 1st and the following day a ridge came into view that appeared like the edge of the moon seen through a large telescope.

On December 2nd the party was well out on the illimitable plateau and henceforward made a steady ascent over a low gradient. A remarkable valley 300 feet deep was discovered on the 3rd. Nothing of the kind has been found elsewhere at so great a distance from the coast on the continental ice. The valley was full of crevasses and contained some walls of ice 6 feet high. An altitude of 4,500 feet was reached on December 4th and 5,000 feet on the 13th. The greater part of the plateau surface was of *névé*, but areas of pie-crust snow were crossed which added to the labour of hauling the sledge and subtracted from the daily distance. The last depot was left on December 12th, at a distance of 200 miles from Cape Denison, and the party proceed with food for seventeen days.

After December 16th the magnetic dip showed that the party was within the polar area. Bage wished to reach the point attained by his chief when with Sir Edgeworth David in 1909, but the limitations of food prevented this. The Southern Party therefore turned back when 301 miles from their hut and 175 miles from the turning-point of Shackleton's Party. Here the dip was $89^{\circ} 43' 5''$ or $16\frac{1}{2}'$ from the vertical. The latitude was $70^{\circ} 36' 5''$ S., the longitude $148^{\circ} 10'$ E. and the height nearly 6,000 feet. The Union Jack and the Ensign of the Australian Government were unfurled before leaving. When the horizon was searched with binoculars nothing could be seen except the endless snow surface, covered with *sastrugi*. In the afternoon the temperature was -12° F. and the minimum at night -25° F.

Full rations for twenty-three days were in the depots and on the sledge, but at least two days would be occupied with magnetic observations. The return journey was begun on December 22nd and the 200-mile Depot reached in six days with two day's food in hand. A sail was rigged on the sledge, and as the wind blew from the south, some long marches were accomplished. On December 28th a record was made in Antarctic handsledging without ski, 41.6 miles being covered in $22\frac{1}{4}$ hours or 16 hours' marching. Could they have known what was going to happen in a week's time they would have jealously hoarded the $4\frac{1}{2}$ days' surplus food they then possessed. They wisely conserved three days' supply but reasonably supposed that the remainder could be indulged in

as a bonus for being ahead of their schedule. A fair average daily distance was kept up after this, but on January 4th, 1913, the rations were reduced as a precaution before finding the 67-mile Depot, from which their distance was estimated to be 11 miles. Drift snow prevented them from seeing the depot that day when they reached its vicinity, and next day snow was precipitated, reducing visibility to a hundred yards. They moved camp 2 miles and waited. The sun peeped out at 6 p.m. and again at 9 p.m. and the altitudes they secured placed them 4 miles south of the depot. Very little food then remained on the sledge and five days' full rations were in this elusive *cache*.

The whole of January 6th and 7th was spent in vainly searching for the stores. According to their observations they were within a mile of the depot, but the blizzards must have swept away the flagstaff and perhaps the mound, for neither could be seen. Snow fell most of the time the search was being carried out, though there were some clear intervals. By the morning of January 8th the lives of these three men depended upon their ability to walk 57 miles on the food then in hand. This was only "one full day's ration with enough pemmican for half a hoosh, six lumps of sugar and nine raisins, rather the worse for wear, oil for two days, and, last but not least, a pint of alcohol." All instruments and non-essentials were dumped. Bage said they felt fairly fit and as we shall see they may have been stronger than they supposed.

The first day's march was estimated at 20 miles, and they were all very thankful for Dr. Mawson's forethought in providing absolute alcohol, instead of methylated spirit, for lighting the primus stove. Here was the kind of emergency that was contemplated and the alcohol in hot water materially assisted in the saving of life. Breakfast on January 9th was as watery as dinner had been the night before. Then these hardy men turned out into a blizzard of 60 miles an hour that caused ceaseless struggles to prevent the sledge making leeway. That night they were happier from the knowledge that more than half the distance had been done; and on the afternoon of the 10th, when the blizzard ceased, much to their surprise the sea appeared on the northern horizon. They thought it was 20 miles away. Their speed must have been greater than they had supposed. Shortly afterwards, the Mac-kellar Islets came into view and Aladdin's Cave was reached in safety. Outside were some dog biscuits and these were munched while other food was being discovered. Chocolate next was

found and after that they proceeded in a happier frame of mind to have a meal.

These men must have been very strong and well matched. They had marched 54 miles on January 8th and 9th with only a few ounces of food and the alcohol to sustain them. Their average rate of progress had been nearly 13 miles a day for the whole 600 miles, and 17 miles a day for the return journey. The scientific work carried out, especially the magnetism, was of great interest.

THE WESTERN COASTAL JOURNEY is one in which almost the whole story is told by the Schedule overleaf. The conditions were crudely simple. First came the failure of the air-tractor after performing a mile in three minutes against a head wind of 15 m.p.h. It also pulled a load of 830 lbs., and undoubtedly was well tested; yet it broke down on the first day of the actual journey. Unsuccessful experiments often lead to later triumphs, and this was one of the milestones on the way to the Antarctic aeronautics of Wilkins and Byrd.

One incident of this journey is of outstanding interest; this was the finding of a meteorite about 7 miles south-west of the Cathedral Grotto. The farthest point reached by this party was in longitude 138° E. on the Antarctic Circle, and 6 miles south of a cape named Cape Robert, from whence heavy pack ice, in 1912, stretched far out to sea. Adelie Land could be seen extending 50 miles to the west-north-west beyond the turning-point; and about 20 miles farther west Wilkes Land had been discovered by Captain Davis.

The Western Party travelled 316 miles in 44 days, on 13 of which they were held up by blizzards. More remarkable than this is the fact that only 11 days, or 25 per cent. of the time occupied by the journey, were free from drifting snow. On 13 days the party marched through it; and this drift is not of a soft yielding nature like English snowflakes, but is hard and dry, resembling a sandblast when driven by high winds. It causes agony to the unprotected eyes. As the season was midsummer, there were more relatively calm days than Madigan found in the spring. The winter in that part of Antarctica is almost unimaginable.

SCHEDULE No. 7

BICKERTON'S WESTERN JOURNEY FROM CATHEDRAL GROTTO

Date	Height	Wind Vel. : M.p.h.	Notes	Snow	Miles
1912 :					
Dec. 5	2,000		Left Grotto and Air-tractor.		12
" 6	3,000	50	Held up by blizzard.	Drifting.	0
" 7		50	" "	"	0
" 8		50-30	" "	"	8
" 9		60-70	" "	"	0
" 10		60-70	" "	"	0
" 11		60-70	" "	"	0
" 12		40	Soft surface.	"	av. 7½
" 13			Hard sastrugi.	"	av. 7½
" 14				"	av. 7½
" 15			Held up.	"	0
" 16			Excellent weather.	No drift.	19
" 17	3,430		" "	"	19
" 18			" "	"	19
" 19	2,650		" "	"	19
" 20			" "	"	19
" 21		80	Held up by blizzard.	Drifting	0
" 22		80	" "	"	0
" 23		80	" "	"	0
" 24		80	" "	"	0
" 25	2,100				13
" 26	2,100		Observations.		av. 7½
" 27	2,100		Return journey begun.		av. 4
" 28					av. 4
" 29					av. 4
" 30					av. 4
" 31			Exploring.		0
1913 :					
Jan. 1			Held up by blizzard.	Drifting	0
" 2			" "	"	0
" 3			" "	"	0
" 4					10
" 5			Bad light.		6
" 6				Drifting	13
" 7	2,600			"	11
" 8				"	9
" 9				"	15
" 10	2,850			"	11
" 11				"	5
" 12		50	Held up by blizzard.	"	0
" 13				"	5
" 14				"	12
" 15			Crevasses.		av. 9
" 16				Drifting	10
" 17			Reached Aladdin's Cave.	"	av. 9

DR. MAWSON'S FAR-EASTERN JOURNEY is unique in Antarctic, if not in polar, history. Its outward distance, 300 miles, was approximately the same as that of Scott's Southern march over the Ross Barrier in 1903; but its most memorable and deplorable feature was the loss of two members of the three-man unit. The heroism of the survivor, Dr. Mawson, is particularly worthy of notice. Lieutenant B. E. S. Ninnis of the Royal Fusiliers and Dr. Xavier Mertz were Mawson's companions. The father of the former, Dr. Belgrave Ninnis, had been surgeon in the *Discovery* on Nares' Arctic Expedition of 1875. Mertz, who was of Swiss nationality, was a Graduate in Law of Leipzig and Bonn Universities and had won the ski-running championship of Switzerland. He was 28 years of age and an expert mountaineer. Ninnis was 23 years old and shared with Mertz the care of the dogs.

Three stages may be noticed in the record of this journey, of which the first, the outward and easterly march, began on November 10th, 1912. Mawson took all the surviving dogs, seventeen in number, and three sledges loaded with 1,700 lbs. of equipment and supplies. On leaving Madigan's Party he passed to the south of Aurora Peak, but his route did not diverge very widely from Madigan's until they were beyond the centre line of the Mertz Glacier. Then the Far-Eastern Party ascended the continental slope on a south-easterly course to a height of over 2,500 feet.

The width of the Mertz Glacier where crossed by Mawson's Party was found to be 30 miles. A rock peak in the glacier was named Correll Nunatak and the usual crevasses abounded here. Observations for position and angles for the survey were taken on reaching the heights beyond the glacier; the altitude also was determined and magnetic observations were carried out. From the elevated viewpoint of November 24th the Mertz Glacier Tongue could be seen extending out to the sea and a series of valleys were found to descend from the plateau northwards to the coast. On the 26th the Organ Pipe Cliffs, 60 miles away, were dimly discerned as a dark hazy patch. The second large glacier was discovered on this day and named after Lieutenant Ninnis. It was of about the same width, 30 miles, as the Mertz Glacier, and a little longer, or about 100 miles to the northern extremity of the tongue. It should be remarked, however, that as the seaward extremity of a glacier tongue breaks away from time to time its length is variable.

An ice-capped island, 12 miles long by 6 miles wide, was seen

in the Ninnis Glacier to the north of the route and named Dixon Island. The descent to this glacier was very steep, and much difficulty was experienced in controlling the sledges which sometimes broke away and rolled down the slope. The crevasses beyond the foot of the decline were dangerous, and progress was extremely slow. Several hours were occupied in advancing 1 mile on November 27th. One of the dogs was lost in a crevasse, and as others had already been killed only twelve now remained.

Dr. Mawson writes : " Our path led over a solid ocean rising and falling in billows, 250 feet in height." There were pinnacles and hummocks all around and for several hours on November 28th a way had to be picked through a mighty turmoil of serac. Two of the sledges that were running in tandem were nearly lost when the trailer broke through a rotten snow bridge and hung vertically down a crevasse. The leading sledge was anchored with ice-axes and Mawson was lowered until he could attach a rope to the tail of the suspended sledge, which was then recovered.

The eastern side of the Ninnis Glacier was reached on November 30th. A hurricane had passed over the party during the night before, and as they began the ascent dense snowdrift was seen on the highlands to the south-west. December 1st, at a height of 900 feet, was quite hot with brilliant sunshine. The shade temperature was 34° F. and the heat made the surface sticky ; as the sun sank and the air became cooler the sledge ran more easily. Next day when they reached about 1,600 feet there was trouble with sastrugi of between 2 feet and 3 feet high, but a magnificent view rewarded their efforts. The mainland slopes appeared, wrote Sir Douglas—

descending on the western side of the Ninnis Glacier. Then the glacier, tumultuous and broken, was seen to extend far out into the frozen sea and, sweeping round to the north-east, the eye ranged over a great expanse of floe-ice dotted with bergs. To the east there was a precipitous coastline of dark rock. . . .

This rock may have been the columnar cliffs, 1,000 feet high, shortly afterwards discovered by Madigan.

On December 3rd, at an altitude of about 2,000 feet, the course was set due east (true) and followed for about 75 miles. A blizzard raged at 70 miles an hour for 3 days, December 6th to 8th, during which time there was nothing to do but rest in the sleeping-bags and plan out the future. Ninnis and Mertz took turns in attending to the dogs. The former had a painful whitlow

agonizing, for action is some relief to the emotions, yet absolutely nothing could be done.

There is no question as to the cause of the fatality. Mertz was on ski, Mawson sitting on his sledge and poor Ninnis walking without ski when they crossed the crevasse. The weight of his body on the smaller area of the unprotected foot had broken the snow lid. Ninnis would not cry out when he felt himself falling because he had tumbled into more crevasses than his companions ; but he had previously either caught himself by his arms or been held by a rope while the sledge remained on the surface.

Mawson wrote : " We stood by the side of the crevasse and I read the Burial Service. Then Mertz shook me by the hand with a short ' Thank you ! ' and we turned away to harness up the dogs." Thus ended the outward journey.

The first stage of this exploration had not only culminated in tragedy but had left the survivors in a precarious position. They were 316 miles from the station with ten days' food for themselves and none for the remaining dogs. The tent had gone, though there was a spare tent-cover on the sledge that had escaped. They must race for Cape Denison, but it would be " a fight with death and the great Providence would decide the issue."

A complete set of observations was taken at a point 2,400 feet above the sea. From here the coastal slope to the limit of vision eastwards was seen to be fairly broken, and the sea frozen to the horizon. The surviving dogs were the worst of the pack, as the best of the animals had been pulling the heavier sledge ; they were fed with old furs and straps which they eagerly devoured. No depots had been left on the outward journey because the travelling had been so bad that the return was to be made over a more inland course where plateau conditions would be found and the coastal irregularities avoided.

Mawson and Mertz, on December 15th, dashed down the slope to the camping-ground of the 12th where the spare sledge had been left, for it had now become a valuable asset and tent-poles were made out of its runners. Mawson and Mertz set out over the plateau with six thin dogs to supplement their other insufficient food supply. There was ample kerosene for the cooker and the dog meat when thoroughly stewed was not unpalatable. The two men were always hungry, however, for they could not afford to eat their fill. They covered from 11 to 20 miles a day until December 21st when the head of the Ninnis Depression was reached.

Their progress then became much slower on account of the crevasses, in spite of the fact that they were 30 miles farther inland than on their outward crossing of the glacier.

On December 24th Mawson and his companion were weaker and had to dump the rifle and ammunition with all instruments that were not essential. The following day, at a distance of 160 miles from Cape Denison, Dixson Island could be seen. Their progress was encouraging, yet 14 oz. of solid food per day, which was their individual allowance, was quite insufficient to maintain their strength and one of them was now suffering very severely from want of nourishment. The divide between the Ninnis and the Mertz Depressions was crossed at a height of 3,000 feet on December 30th, but Mertz, who was naturally a bright and sociable comrade, seemed to be unwell. He said that the dogs' meat did not suit him, so it was stopped and only a modicum of the ordinary sledge food eaten. This left them both painfully empty.

Mertz was not equal to travelling on New Year's Day, 1913, and complained of abdominal pains. As Mawson was never free from such pains he supposed that his companion merely felt them more acutely. He found, however, that Mertz was very much worse than himself, for again on January 2nd no march could be made. Between 4 and 5 miles were accomplished on the 3rd, Mertz having his fingers frostbitten. The next two days were lost because Mertz thought that resting would be good for him. Mawson never hinted that his own slender chance of life was slipping away, though all this delay must have been terrible for him. An attempt to march was made on January 6th, when Mawson persuaded Mertz to ride on the sledge and pulled him $2\frac{1}{2}$ miles; Mertz then felt cold, so they camped. In the tent he seemed depressed. They were then a hundred miles from the station, having rations for several days.

That evening Mawson wrote in his private diary: "Both our chances are going now." He himself felt cold in the tent but he had to remain inactive when he could have maintained his bodily heat and his life by moving on. He ignored his own needs, however, for Mertz was now so weak that he had to be helped in and out of his sleeping-bag. This is the only occasion in which an Antarctic explorer has been left alone with a dying companion, though several others, in parties, have risked their lives to save their comrades. Mawson deliberately placed his own life in jeopardy for Mertz. There was little hope of saving himself after

all this delay ; and he did this knowing he could not save his friend, but simply that he might minister to his dying needs.

On January 7th Mertz seemed to have a fit and Mawson wrote :

This is terrible . . . I pray to God to help us. . . . During the afternoon he had several more fits, then became delirious and talked incoherently until midnight, when he appeared to fall off into a peaceful slumber. So I toggled up the sleeping-bag and retired worn out into my own. After a couple of hours, having felt no movement from my companion, I stretched out an arm and found that he was stiff. My comrade had been accepted into "the peace that passeth all understanding." . . . We loved him ; he was a man of character, generous and of noble parts.

Thus the second stage of this terrible journey ended like the first in tragedy. Mawson was now on the verge of a collapse and his abdominal pains had developed a permanent weakness. "There appeared to be little hope of reaching the Hut," he wrote. The thought that spurred him on was that of struggling near enough to Cape Denison for his records to be found with his body, so that his work would not be lost to the world. This was what had happened to Captain Scott only ten months earlier.

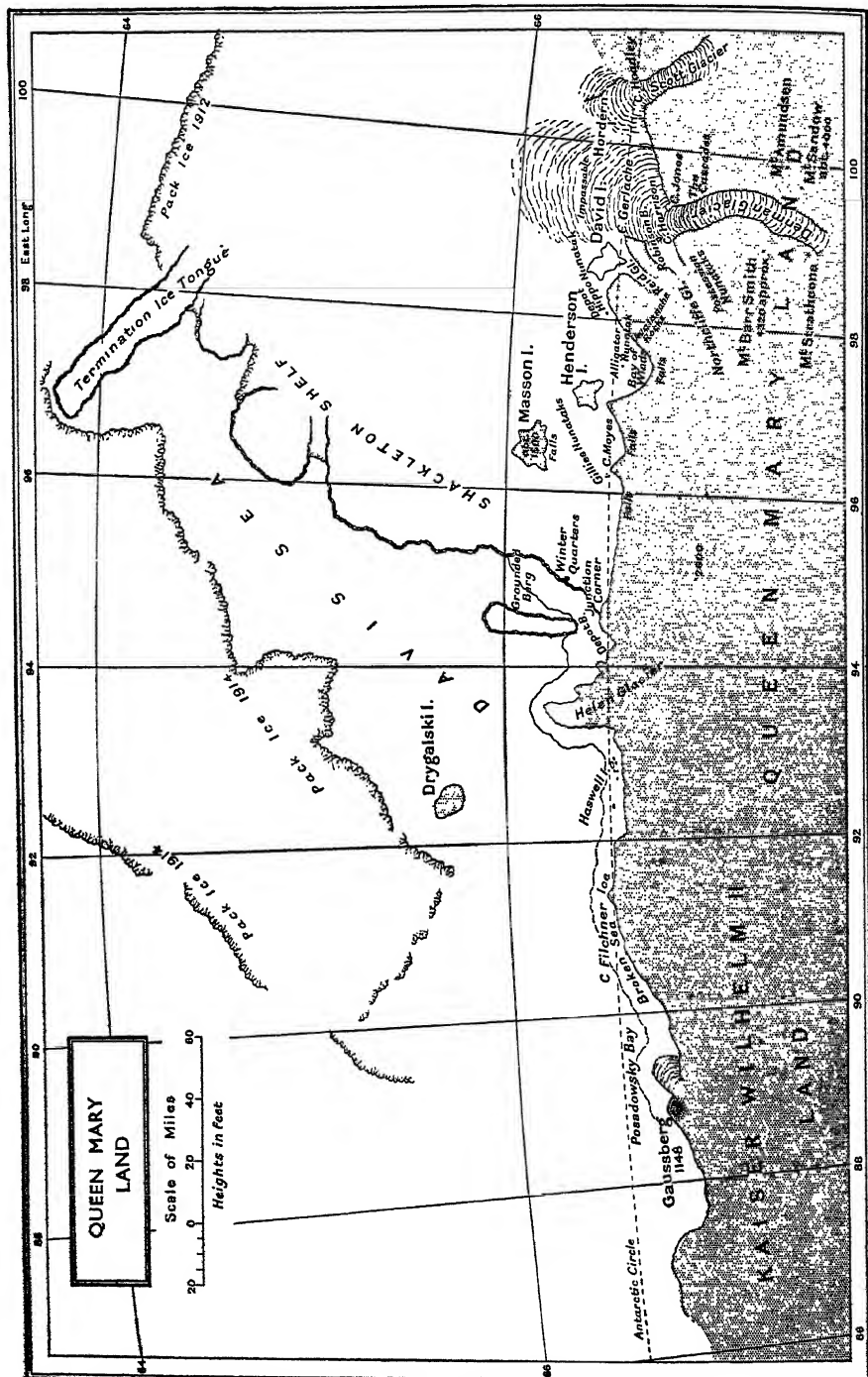
Alone on that frozen waste Mawson buried Mertz and read the Prayer Book Service. Then he set up a cross of old sledge-runners. It took him two days, in his weak state, to do this. On January 9th he wrote : "There is little chance of my reaching human aid alive." The following day a blizzard raged and he did not set out until the 11th which was calm and sunny. He then found his feet in a shocking condition and had to treat them carefully. A sun bath strengthened him greatly, but his nerves began to get worn after marching $6\frac{1}{2}$ miles, so he camped and tended raw patches that had appeared all over his body.

Next day another blizzard prevented travelling, but in the afternoon of January 13th he made $5\frac{3}{4}$ miles at great cost to his injured feet, and he wrote : "Things look bad but shall persevere." He was now on the Mertz Glacier and among crevasses. Progress varied from 1 mile to 5 miles a day, and there was constant danger. On the 16th he had a narrow escape from a great blue hole like a quarry, and next day he thought the end had come. He fell through the snow lid into an unseen crevasse and hung 14 feet below the surface, with the sledge to which he was attached, creeping towards the edge. He expected to die as Ninnis had died, but the sledge pulled up without letting him down. The rope had not cut completely through the snow cornice and when he had

managed to climb up to the level of the surface a further mass of snow gave way and precipitated him again into the crevasse.

Still pendulous in his harness over the abyss, but now exhausted, he was also chilled to the bone. Worst of all, in his weakened condition, he lost heart and had "the firm conviction that all was over except the passing. Below was a black chasm; it would be the work of a moment to slip from the harness, then all the pain and toil would be over." He resisted the temptation and made one last effort. In this he succeeded by climbing out feet first and he lay by the side of the crevasse on the surface for over an hour before he had recovered from the reaction.

To provide against any repetition of this danger he made a rope ladder which saved his life several times because the sledge held firmly. On January 19th the glacier was left behind, and on the 22nd the sea came into view. Mawson felt very weak but made good progress by the use of a sail on the sledge, though on several days he could not travel. At last, on January 29th, almost a miracle happened. Only 2 lbs. of food remained and he was 23 miles from Aladdin's Cave, so he wondered if he could get in. The issue would have been very doubtful had he not seen a mound on which was placed a bag of food. A search-party had been out and left it for him with the news that the *Aurora* had returned. Mawson found the food only six hours after the search-party had left it and he reached the cave on February 1st. A blizzard kept him there for a week. Not until the 8th was it possible for him to descend to Cape Denison, and then as he walked down the slope he saw the ship like a speck on the horizon, sailing away. Human figures ran out of the Hut to be afterwards hidden by the slope and he wrote: "It seemed to me that they had run away to hide . . . the long journey was at an end—a terrible chapter of my life was finished."



CHAPTER X

DAVIS OFF THE ICE-CLIFF COASTS AND WILD ON THE SHACKLETON SHELF

CAPTAIN JOHN KING DAVIS is a great-grandson of Lieut.-General the Hon. Sir Henry King, who was the fourth son of Robert, second Earl of Kingston; and an uncle of the Antarctic navigator was the Hon. H. E. King, a well-known Queensland pioneer and at one time Speaker of the Legislative Assembly. J. K. Davis went to sea in the year 1900 and in 1907 was appointed Chief Officer of the *Nimrod*. During her Antarctic voyage he was in charge of the oceanographical work, as he was on the *Aurora* when, as we have seen, he was Master of the ship and Second-in-Command of Mawson's Australasian Expedition. We left him on January 19th, 1912, after landing the Main Base at Cape Denison, on the point of sailing westward with the double purpose of exploring the unknown coastline and of finding a suitable locality for the establishment of Wild's base. The *Aurora* was the first ship since the days of sail to undertake a voyage of discovery along this part of the Antarctic seaboard. Much, therefore, was expected of this trip and much was accomplished.¹

Early in the morning of January 20th a reef, extending out to sea for 12 miles from the land, was encountered and its northern end rounded. Davis was reminded by this reef that his business was to make a chart of the coastline and not to depend on one; for D'Urville made no mention of it although he placed his Cape Discovery only 6 miles to the west of this line of rocks. The *Aurora's* position at noon was latitude 66° 33' S. and longitude 140° 28' E. A sounding gave 308 fathoms on mud. The ship's course was set parallel to the coast of Adelie Land at about 12 miles distance until 10.30 p.m. when heavy pack was reached stretching north-eastwards from the coast, with the appearance of a barrier extending in a northerly direction. This appearance of shelf ice was seen again as the edge of the pack was followed on January 21st and 22nd. The high land reported by Lieutenant Wilkes in this locality was not seen.

¹ See Charts Nos. 7, 10.

Captain Davis expected to sight D'Urville's Côte Clarie on the 23rd but he actually sailed over its charted position and saw nothing more than a number of icebergs, though the air was clear. At noon on this day the *Aurora* was in latitude $65^{\circ} 2'$ S. and longitude $132^{\circ} 26'$ E. and a sounding gave 160 fathoms on mud and small stones. Davis then wrote: "We sailed over the charted position of land east of Wilkes' Cape Carr, but no trace of land was seen in the locality." A southerly course had been made from 10 a.m., and at 5.30 p.m. land was seen to the south and approached to within 12 miles. This land was out of sight from Wilkes' ships, but has been named Wilkes Land in honour of the American explorer.¹ It may possibly have been miraged up into Wilkes' sight.

The *Aurora* pursued first a north-westerly and afterwards a westerly course throughout January 24th until the pack forced her once more to the north. Violent gales then drove the ship northward for several days and she was often in great peril from refusing to answer her helm in heavy seas. On the 29th the coastal ice pack was again sighted. Two days later Davis sailed over the charted position of Balleny's Sabrina Land and came within 7 miles of Totten's High Land that Wilkes claimed to have seen. This land, Davis wrote, "should have been visible to the southward, as the weather was fine and clear, but nothing was visible over the heavy pack except a faint blue line which might have been a lead, but bore no resemblance to *high* land."

On February 1st, 1912, the *Aurora* was in latitude 65° S. and longitude 116° E. where the depth was 927 fathoms on mud and stones. The longitude of Wilkes' Knox Land was reached on the 3rd and Davis hoped that a landing-place for Wild's Party would be found in this locality, but heavy pack held them 50 miles to the north of the position. A gigantic ice tongue was discovered on February 8th, and as it occupied the position assigned by Wilkes to his Termination Land, Davis named it Termination Tongue. He sailed round its north end which was found to be 80 feet high and about 10 to 15 miles in width. The tongue was more than 50 miles in length and was afterwards found to be well over a hundred miles out of sight of the nearest land.

Blizzards were a menace to navigation in these uncharted and

¹ Mr. J. M. Wordie remarks that this land should be referred to as Mawson's Wilkes Land, but no other "Wilkes Land" exists where it was charted in 1840. Knox Land will probably be found.



ELLIOT AND FRY]

COMMANDER FRANK WILD; C.B.E.

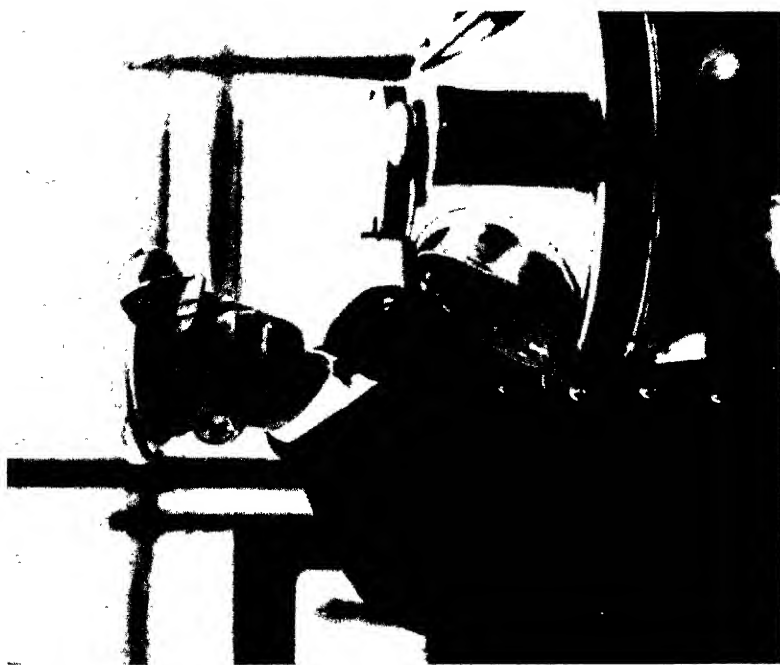


TABLE TALK, MELBOURNE]

CAPTAIN JOHN KING DAVIS
On the bridge of the *Discovery*

ice-encumbered waters. It was therefore with no little satisfaction that, on February 12th, Captain Davis made the important discovery of an open sea that Dr. Mawson subsequently named the Davis Sea in honour of its discoverer. It is approximately 200 miles in length, but its width varies with the position of the pack that forms its north-western boundary. As the discovery of the Ross Sea led to that of South Victoria Land, so through the discovery of the Davis Sea other new lands were found.

Early on February 13th, Davis says he "stood south in absolutely open water. . . . Shortly after noon, an ice tongue was observed. . . . This was followed to the southward. Early in the afternoon, high snow-covered land was seen trending nearly east and west."¹ This new continental country now bears the name of Queen Mary Land. At 4.30 p.m. progress towards the land was stopped by pack ice over which Frank Wild advanced on foot for several miles and reported the coast to be 25 miles away. As no station could be landed here Davis retired northwards, parallel to the ice tongue, and on the 15th rounded its northern end and stood to the east, when the tongue was seen to be a stranded iceberg 30 miles long. At 8.45 a.m. on the 15th—

a high barrier formation was observed. . . . At noon [wrote Davis], we were up to the point where the ice-wall met the floe-ice. We sounded in 182 fathoms. Mr. Wild and party landed on the floe and were able to get to the top of the overhanging cliff

by means of a high snow ramp. This ice cliff was part of the great Shackleton Shelf which is a large ice barrier afterwards found to extend more than 150 miles along the coast of Queen Mary Land and to project 180 miles into the Davis Sea.

The *Aurora's* supply of coal was now so low that if Wild's Party were to be landed no longer delay was possible. He therefore took the risk of establishing his station on the Shackleton Shelf at a point about 600 yards from its edge and 17 miles from the mainland. The position of the Western Base, as Wild's station was named, was in latitude 66° 18' S. and longitude 95° E. A flying fox was fixed up and by February 20th, 1912, all the stores and equipment had been elevated to the top of the cliff. Wild had seven companions, of whom Dr. Jones was to lead the Western Party; and at 7 a.m. on the 21st they all scrambled over the rail with their blankets on their backs, Davis wondering, when he

¹ "With the *Aurora* in the Antarctic," Capt. J. K. Davis, 50.

sailed away, if he would find them there when he returned the following year.

There was less risk in electing to live on the Shackleton Shelf than appears at first sight, for the ice was probably 500 feet thick and well aground; in addition to which, Wild's Party had no desire to return to New Zealand in the *Aurora*, and this was their only opportunity of setting up a station. Its erection, apart from the wireless installation, was completed in a week, though it was interrupted by one moderate blizzard that deposited 6 feet of snow. Wild's Party soon found that they had come to a region of very heavy precipitation. They were less than 200 miles from Gaussberg where the pack had been depressed below sea level by the weight of snow. It was not long, therefore, until the station was buried, except for the highest point of the roof, and convenient passages were easily dug in the enveloping snowdrifts. From March 4th to 6th a blizzard raged and deposited 12 feet of snow. After an interval of one day there was another storm, lasting from the 7th to the 9th, when the wind reached a velocity of 90 miles an hour. Obviously the wireless masts could not be erected. An ice-capped island, named Masson Island, appeared in clear weather about 40 miles away to the north-east and has the distinction of being the first island discovered in barrier ice.

On March 14th, Wild took a reconnoitring party to the south, where the ice-clad slopes of the continent rose rapidly to a height of 3,000 feet. The new land was reached on the following day when numerous crevasses appeared and camp was pitched on the lower slopes of the hills, with magnificent icefalls on each side. These were examined on the morning of the 16th and in the afternoon a gale came on with heavy drift that kept the party in its tents until noon of the 17th. The camp of March 18th was pitched at a height of 1,410 feet, above which the work of hauling the sledges became more laborious, and the two following days were occupied in advancing 9 miles to a height of 2,000 feet. On the 21st a distance of $7\frac{3}{4}$ miles was accomplished, to a height of 2,220 feet, which took them over the rim of the plateau, and then a whole week's blizzard held them up. The tents were nearly buried in snow and the party had to turn back on March 30th, after leaving a depot at a height of 2,600 feet. The station was reached on April 6th.

The wireless masts were at last erected, but they only remained standing until the first blizzard. Winter passed almost, though

not quite, uneventfully. The hut was well lighted by acetylene, which, however, might have destroyed it in the spring when the gas apparatus caught fire. Moyes assisted Wild in conducting a religious service every Sunday. Work was done on weekdays from 10 a.m. to 1 p.m. and the remainder of the day was devoted to sport and recreation, except for the observations of the meteorologist and night watchman.

On August 22nd Wild and five companions set out on one of the worst journeys in the world—a depot journey eastward over the Shackleton Shelf.¹ The first rock was discovered on the 23rd at the small Gillies Nunatak between Masson Island and Cape Moyes. A blizzard kept the party in camp for three days, August 27th to 29th. Then continuing eastward, parallel to the coast, Henderson Island in the Shackleton Shelf and the Bay of Winds on the coast of the mainland were reached and more bare rock was seen. Queen Mary Land is so heavily glacierised that exposures of rock are rare, and the Alligator and Hippo Nunataks farther east were much welcomed. The latter was 420 feet high and consisted in a gneissic granite, on which moss was growing. There were some imposing rock cliffs on the coast of the mainland in this locality that Wild named the Avalanche Rocks and Delay Point. The Hippo Nunatak lay off this point, at a distance of 84 miles from the station, in latitude 66° 25' S. and longitude 98° E.; and here, on September 4th, the depot was left and the party turned back towards the hut.

The first camp on the return journey was pitched a quarter of a mile from the foot of the Avalanche Rocks which towered aloft with 400 feet of rock capped by 200 feet of ice. The wind suddenly flattened out both tents, and when they had been pitched again a tremendous avalanche came down with terrific noise and the cliff was entirely hidden by a cloud of snow. Some of the rocks carried down by the avalanche nearly reached the tent. While breaking camp next morning, September 5th, a squall struck the tent and tore the material from top to bottom. A hole, 3 feet deep, 12 feet long and 6 feet wide, was dug in the snow and roofed with the sledges and the best tent. Here the six men were forced to remain for five days. The velocity of some of the gusts exceeded a hundred miles an hour. Harrisson was lifted by the wind over Wild's head and thrown down 20 feet away; avalanches crashed uncomfortably near. On September 8th, the fourth day of the

¹ See Chart No. 10.

storm, nothing could be seen at 5 yards' distance through the drift-snow.

A move was made for the station when the sun shone out on the 10th, and 20 miles were marched; but next day there was another blizzard, with a temperature of -30° F. The sleeping-bags were then in a dreadful state, but this party took all such hardships as "part of the game," and the station was reached in safety on September 16th.

The Western Depot Party, led by Dr. Jones, started on September 26th and three days later Wild led out a party to visit the depot he had left on the hills. It took 6 days to struggle 19 miles through snow and wind, and when one of the party strained a tendon they all had to retreat to the base. October brought a continuance of unfavourable conditions for sledging, with thirteen out of sixteen, apparently consecutive, days of thick drift and high wind. The Western Depot Party became overdue and Wild organized a search-party for them on October 26th when Dr. Jones and his comrades were met, 9 miles from the station, after having made another of the worst short journeys in the world.

The Helen Glacier had been reached on the sea ice, by Dr. Jones' party, at a distance of 45 miles from the hut; but the Davis Sea was open beyond that point and it became necessary to return for 17 miles, to Junction Corner, before an ascent to the land could be made. The going over the land ice was rough and the weather, as usual, bad for travelling. When a height of a thousand feet had been reached another Antarctic record in hardship was made, the party being held up for *seventeen days* by a blizzard. One tent collapsed and its occupants, like Wild's Party, had to dig a hole in the snow for refuge. After the storm the party returned to the station.

It was evident from these spring reconnaissances that the most favourable course for an extended journey lay eastwards over the Shackleton Shelf. An interesting geographical problem also lay in this direction, for Lieutenant Wilkes, U.S.N., in 1840, had charted his Knox Land 240 miles eastward of the position of the Western Base, in nearly the same latitude, and Wild expected to go much farther than this. He led the Eastern Party himself, taking two other men with him; while Dr. Jones, with another three-man unit, was to make the main western journey. Harrison the artist wished to accompany Wild as far as the Hippo Depot, to make some sketches and biological collections. He had no fear about returning alone,

though the distance was a hundred miles. One man, Moyes, would have to lead a solitary existence at the station until Harrison returned, but there seemed little objection to this. Each party took fourteen weeks' provisions.

Wild's Party set out at the end of October and reached the Bay of Winds in four days. On November 4th there was a blizzard, and next day the Alligator Nunatak was passed. Four boulders were found, on the 6th, at a distance of 3 miles from the Avalanche Rocks; and the sledge left at the Hippo Nunatak, on the depot journey, had been completely blown away and could not be found. The total load to be taken on from this depot, 1,180 lbs., could not be carried on one sledge; so Harrison remained with Wild's Party that his sledge might be utilized. Moyes would be alone at the base for several weeks, and might fear that Harrison was lost, but this could not be helped.

An examination of the Hippo Nunatak was made on November 7th; but the wind was rising, and as its velocity on the 8th and 9th varied from 60 to 80 miles an hour, work was impossible. On the 10th a climb of 600 feet was made in half a gale to examine about 80 acres of rocks on the mainland; they were found to be mainly mica schists and granite. After another blank day some interesting discoveries were made. The first of these was David Island, where a depot was left on November 14th; and then the strait between this island and the mainland was followed in a south-easterly direction. A valley with a glacier, named the Reid Glacier, was reached on the 16th and the ice in the strait was much disturbed by the descent of this glacier from the highlands in the south. A vast sea of crushed ice, tossed and piled in every direction, lay ahead, so a halt was made in the vicinity of Cape Gerlache.

Wild was now confronted by appalling difficulties. Some mighty unknown glacier, he wrote, "pushing out from its valley, had broken up the shelf ice on which we were travelling to such an extent that nothing without wings could cross it." A detour either to the north or south was inevitable. The hitherto unknown glacier (named the Denman Glacier) that was rending the Shackleton Shelf, was then seen, 12 miles wide, rolling in magnificent cascades from a height of 3,000 feet in the south. As no passage could be seen in its vicinity Wild turned to the north. In this direction he found the ice so honeycombed with pits and chasms that the men felt like flies walking on wire netting. The best camp site that could be found, after 4 miles' progress, had wide crevasses

within a few yards on every side. In the silence of the night the glacier boomed and cracked like heavy gun and rifle fire, accompanied by a weird moaning, like souls lost in this frozen Hades.

The following day, November 18th, dawned fine and bright. Five miles were made northward and then, wrote Wild, "There broke on us a most rugged and wonderful vision of ice-scenery . . . an enormous chasm over 1,000 feet wide and from 300 to 400 feet deep, in the bottom of which crevasses appeared to go down for ever." Wild was forced to the west in the direction of David Island, from the summit of which he obtained a good view of the distorted ice to the eastward. Blizzards prevented progress until November 25th, and on the next day three hours were occupied in negotiating half a mile. Every man had falls into crevasses, many of which were capacious enough to swallow the whole team and sledge. On the 27th progress was impossible on account of the pitfalls in every direction and Wild decided to turn back and make an attempt to the south. Heavy falls of snow held the party up until December 3rd, when the retreat began from approximately longitude $99^{\circ} 12' E.$, Wild's farthest point. There were some bad falls into crevasses, and 18 inches of soft snow lay on the ground, hence camp was pitched with only 2 miles to their credit, while $2\frac{1}{2}$ miles were accomplished on the 4th. On returning to David Island on the 6th a large number of petrels and their eggs were secured.

On December 11th Cape Gerlache was reached and the party had to cross the newly-discovered Robinson Bay, fed by a glacier that Wild named the Northcliffe Glacier. This crossing was accomplished next day and more rocks were found on the Possession Nunataks, 200 feet high, and consisting of gneiss rich in mica, felspar and garnets. Eight hundred feet were ascended in the next four miles up the slope and then camp was pitched. The route was parallel to the Denman Glacier and its icefalls were seen on their left. From a height of 3,000 feet the disrupted ice they had attempted to cross on the plain below was seen to extend for 30 miles. Soft snow then made the toil extremely hard and only 4 miles were covered on the 18th; but next day Mount Barr Smith (4,320 feet) was reached and climbed. Another nunatak was seen 15 miles to the south and named Mount Strathcona. The Denman Glacier, at the farthest point seen to the south, was found to descend in a steep valley about 7 miles wide. A crevassed valley and two nunataks, one of them 4,000 feet high, were sighted across the glacier to the east.

On December 21st to 22nd there was food for only one more week, during which time the party could not advance beyond their range of view, for the surface was covered with 18 inches of soft snow. The return was therefore begun from Mount Barr Smith and accomplished with comparative ease. At the Avalanche Rocks, masses of ice, weighing about 20 tons, were found 200 yards beyond the hole in which the party had previously sheltered. The last day's run to the station, on January 6th, with the aid of a strong wind, was 35 miles. About 200 miles of new land had been surveyed on this journey.

Dr. S. E. Jones led the three-man party which started on November 7th for Gaussberg in Kaiser Wilhelm II Land. Professor Drygalski had discovered this country in 1902 and it lay about 200 miles to the west of the Shackleton Shelf. A moraine of six rocks was found by Dr. Jones near Junction Corner and the depot picked up, but the load could not then be pulled without relaying. There were rations for thirteen weeks on two sledges. From November 13th to 16th a blizzard stopped progress, and on the 17th camp was pitched near the Helen Glacier, distinguished from the general surface of the land-ice by a series of icefalls. An ascent was made to a height of 1,000 feet in the hope of evading these difficulties, though even at this level there were numerous crevasses into which some of the party fell, as well as pressure mounds from 10 to 20 feet in height. An observation of the sun was taken here and the latitude found to be $66^{\circ} 47' S$. Great difficulties were afterwards encountered with crevasses on the western side of the glacier.

Several times during this journey an uninterrupted view was obtained of the Davis Sea for many miles to the north and it was always found to be free from ice. A blizzard held the party up from November 20th to 23rd, during which time a foot of snow was precipitated daily. On the 25th, when near the coast, Drygalski Island was seen, 30 to 40 miles away to the north-north-west. The greatest discovery of this journey was then made, consisting in a group of about a dozen rocky islands, the most distant being 5 miles off the coast, and all surrounded by pack ice. A way down to them was reconnoitred through chaotic masses of ice, in which the trickling of water was an unusual and pleasing sound. Observations for longitude and magnetic variation were taken and then, on November 26th, the larger sledge was left on the mainland

and a week's supply of food transported to the islands. The largest of them, named Haswell Island, was a little less than a mile in length and breadth, and about 300 feet high. Near it was probably the most populous Emperor penguin rookery yet discovered in Antarctica, with about 7,500 birds, and covering from 4 to 5 acres of floe. Numerous rookeries of Adelie penguins were also found. Snowstorms from November 27th to 30th did not entirely prevent short excursions from the tent, and eggs of various birds were secured.

Rocky outcrops could be seen on the coast of the mainland and signs of previous glaciation were found on the rocks of Haswell Island. The most marked feature was the wonderful abundance of bird life; and perhaps the greatest find was a rookery of about 300 Antarctic petrels, for the nesting-place of these birds had not previously been discovered. Cape pigeons and their eggs were added to the collection, also Fulmars, Wilson and Snow petrels, Skuas and Weddell seals. Truly this was a biologist's paradise, with algæ in the pools, lichen and moss on the rocks. On December 2nd a cairn was erected and photographs of the islands were taken. Next day the mainland was reached, the large sledge dug out of the snow and the western journey resumed. It became necessary to ascend to a height of 2,000 feet, as the lower parts of the continental slope were seamed with crevasses. Chasms 50 feet deep were encountered even here, and on December 7th a detour to the south was necessary, near the head of a valley, in which situation the ice-cap fell in a series of precipitous terraces for about 1,000 feet.

Disrupted ice, snowstorms and wind hindered progress very considerably, though occasionally a sail on the sledge proved a useful auxiliary. On December 12th the open water of the Davis Sea was seen again, near the ice-cliffs; for several days the route was parallel to the coast at about 10 miles inland. The first view of Gaussberg was obtained on December 16th but its approaches were well defended by crevasses. Next day it was found "impossible to reach Gaussberg by a direct route. The ice ahead was cleft and split in all directions, and, in places, vertical faces stood up to a height of 100 feet." A successful flank attack on December 23rd led the party to an altitude of between 2,500 and 3,000 feet. The last 17 miles were travelled over dangerous country, as may be seen in the splendid photograph reproduced by Professor Hobbs.¹

¹ "Characteristics of Existing Glaciers," opp. p. 246.

So effectively is Gaussberg entrenched that no other line of approach is possible. Both to east and west are magnificent icefalls.

Gaussberg is an extinct volcano rising 1,200 feet above the sea, pyramidal in shape and with the continental ice abutting its southern side 800 feet below the summit. Its sides are covered with volcanic fragments. Two cairns and many bamboos were found, but no record of the German occupation ten years earlier. Dr. Jones' Party left a record of their visit and took careful observations for longitude, latitude and compass variation. The distance marched from the Western Base had been 215 miles, without reckoning a hundred miles of relaying; and 160 miles of this distance were over new land.

There would have been little purpose in extending the journey farther westward, for a week's march could be seen from the summit of the mountain, and food remained for no longer than this. Christmas festivities were not permitted to interfere with business and the return was begun on December 26th, a more southerly course being set than on the outward journey, to avoid crevasses. A comparatively rapid journey was made, though hindered by blizzards, and a maximum height of 3,025 feet was attained. Except for the sight of a fine parhelion on January 9th, the return was devoid of unusual incident and the station was safely reached on the 21st.

Wild's instructions were to be ready for embarkation not later than January 30th, 1913, and by this date he had several tons of material waiting near the edge of the Shackleton Shelf, though at that time 6 miles of pack ice intervened between the ice cliffs and the open sea. The food supply at the Western Base, except for meat, was sufficient for another year, so a store of seals was laid in. The party was thus safe should relief not arrive.

We left the *Aurora* as she turned northward after landing Wild's Party on February 21st, 1912. For thirteen hours she steamed along the high ice walls of the Shackleton Shelf until they turned, in latitude 65° S., to the east-south-east. Fog was a great danger for several hours while navigating among numerous icebergs, some aground and others adrift; but the absence of wind saved the ship from disaster, and she emerged into clearer waters near Termination Tongue. Hobart was reached on March 12th, 1912, when the *Fram* was passed in Sandy Bay and a cheer given for Amundsen's success in attaining the South Pole. The *Aurora* went on to

Sydney for a complete overhaul and then made an oceanographical cruise that is outside the scope of this volume. We must notice, however, that a call was made at Macquarie Island in June, 1912, and the station found in full working order, but no messages had been received from Cape Denison. This cruise ended on August 17th and another month's oceanographical work was carried out, from November 12th to December 14th. Preparations were then made for the second Antarctic voyage.

The *Aurora* on this voyage rejoiced in two Master Mariners with the same surname. The ship was still under the command of Captain John King Davis, but Captain James Davis of Hobart also sailed as whaling expert. There were several other passengers, including the Secretary of the expedition and a Dutch marine artist. A heavy mail, 521 tons of coal and thirty-five sheep, were being carried. Lastly, twenty-one dogs, presented by Captain Amundsen, were taken on board.

Captain James Davis piloted the ship out of Hobart on December 26th, 1912, and on the 29th the first deep-sea sounding was taken near the one hundred and fiftieth meridian east. The usual gales were met with on the way south, one of which did some damage. Blue whales were seen on January 11th, 1913, and on the following day Captain J. K. Davis wrote: "We have sailed right over the position of the barrier, met with in 1912, and seen no trace of it. Apparently Côte Clarie, described by D'Urville in 1840, and discovered by us to have disappeared in 1912, was a similar ice-formation."¹

The *Aurora* sounded her way, late on the 12th, into Commonwealth Bay and was off the Mackellar Islets at midnight. At 2 a.m. on January 13th the starboard anchor was dropped. A fierce squall struck the ship at 6 a.m. and broke the anchor chain. The port anchor was then dropped, but the wind suddenly swung round to the north and sent the ship's stern to within a hundred yards of the ice cliffs, though there were still 17 fathoms of water under her keel. The weather did not moderate sufficiently to establish communication with the shore until noon, when it was found that three of the sledging-parties had not yet returned.

Dr. Mawson's instructions were that if he had not reached Cape Denison by January 15th, 1913, Captain Davis was to take full charge of the expedition. There was no anxiety yet regarding the safety of Mawson's Party and on the 16th Madigan's Party returned.

¹ "With the *Aurora* in the Antarctic," 85.

On the 17th Davis invited Bage and Madigan to a conference on the ship, at which their first decision was to have the wireless gear put into working order. On January 18th the Western Party returned to the station, leaving only Mawson's Party in the field. Davis considered that the *Aurora* should leave Cape Denison for the relief of Wild's Party not later than January 30th. On the 20th he appointed Madigan leader of the Relief Expedition to remain at Cape Denison for a second year, and sent out a search party as far as Aladdin's Cave to look for Mawson. This party returned on the 24th without having seen any sign of their chief; a flag was to be flown at the station to notify the ship of Mawson's return. Gales were frequent, and during a terrific gust on January 25th another of the *Aurora's* cables parted. The spare anchor was lost on the 29th when, for the third time, the chain was broken by the strain, and the 5-cwt. kedge anchor afterwards lost a fluke, leaving the ship unable to ride out bad weather.

The supplies for the second season were landed by January 28th, 1913, when the wireless plant started to operate. A second search-party was sent out for five days on a south-easterly course and left three depots of food, one of which, as we have seen, probably saved Mawson's life. This party had no conception that on January 28th they were camping within 5 or 6 miles of their lost leader, and they returned to the station on the 29th in great anxiety for his party. While these searchers were away Captain Davis took the ship eastward at a distance of about two miles from the coast, firing signals frequently and sending up a large kite to a height of 500 feet. The Mertz Glacier was reached on January 30th and followed to the head of Buchanan Bay, but all efforts to attract attention were fruitless and Davis returned to his anchorage off Cape Denison on the 31st, confident that something serious had happened to Mawson, now sixteen days overdue.

One of the most terrible hurricanes experienced in Antarctic waters then broke out and continued for a week, the velocity of the wind attaining 80 miles an hour. Although Captain Davis and his crew fought for the ship magnificently, for several days the issue was uncertain. Davis says that while the *Aurora* was steaming head to wind at ten knots an hour, or about 50 per cent. above normal capacity, she was being driven astern so fast that

the wake of the ship was passing the bow at a rapid rate. On February 6th just as the sun was showing over the ice-slopes, the wind became wilder, and the squalls really terrific. The ship was absolutely unmanageable, and driving

out to sea. I was expecting the masts to go overboard every minute. This lasted about two hours, when the squalls became less violent.

When the hurricane ended, on February 8th, Davis at once signalled to the station for the ten members of the expedition who were returning home to come on board. He was then considerably overdue in leaving for the rescue of Wild's Party and dare not wait longer. He left instructions with Madigan to make an exhaustive search for Dr. Mawson. The *Aurora* left her anchorage at noon, and at 8.30 p.m. the wireless officer handed to his captain on the bridge the following message: "Mawson returned. Ninis and Mertz dead. Return immediately and pick up all hands." The ship was put about, but a dense mist came on at midnight and the compass being useless so near the Magnetic Pole, Davis could only hope that he was steering south. The ice cliffs were dimly seen at 3 a.m. on February 9th and followed eastward. In a few hours, when near Cape Denison, another gale came down and made communication with the shore impossible. Davis signalled for instructions but received no reply. At 6 p.m., as the gale was increasing, he made a most difficult but wise decision and steamed west. He knew that he would not be able to return here after relieving the Western Party, without risking the lives of all on board the *Aurora*; but Mawson and his staff were now safe, while the fate of Wild's Party was uncertain and might be perilous. The ship, moreover, was not provisioned for a winter, so he held on his way to the west.

Davis became more anxious about the men on the Shackleton Shelf when westerly gales caused delay. Termination Tongue was sighted on February 20th, 1913, but 80 miles of heavy floes still had to be negotiated, and a blizzard was encountered on the night of the 22nd in the sea of bergs, where navigation had been so dangerous the previous year. Davis wrote:

At 8 p.m. the driving snow and growing darkness made it impossible to see any distance ahead. The next seven hours were the most anxious I have ever spent at sea. . . . We passed through the sea of bergs without mishap, guided and protected by a Higher Power.

The Shackleton Shelf was sighted at 4.30 a.m. on February 23rd. At 11 a.m. the depot flag was seen and eight figures appeared on the edge of the floe, whence they all promptly dived into the sea; they were Emperor penguins. The human inhabitants of the ice shelf were sighted soon afterwards and replied to the ship's hail that all were well and they were glad to see the *Aurora*. Then

Wild's question : "Is everything right at the Main Base?" was received in an ominous silence that sent a pang of dread through the waiting men. In a few minutes they were aboard and heard all the news both good and bad.

If Wild and his companions were glad to see the ship, Davis was equally relieved to find them all in safety. A quick embarkment was made and they sailed to the north at 9 p.m., for Davis realized that not an hour could be wasted so late in the season. There was insufficient coal for the ship to attempt a return to Cape Denison had this been otherwise possible. By February 26th 300 miles of berg-laden sea had been passed through, and Hobart was reached on March 15th, 1913. Here news of the Scott disaster was received and it was learned that Dr. Mawson was in wireless communication with civilization.

We must now turn back about a month and resume our tale of Dr. Mawson's experiences after his tragic arrival at Cape Denison.

He found that the *Aurora* had only left a few hours before he reached the station ; but after recalling her the wind rose to sixty miles an hour and Mawson sent Davis another message, which was not received, giving him the choice of waiting for a calm or leaving at once for the Western Base. When Mawson saw that the ship had gone he wrote of Davis' decision : "At such a critical moment determination, fearless and swift, was necessary, and, in coming to his momentous decision, Captain Davis acted well and for the best interests of the expedition."

Mawson found that ample provision had been made for the party of seven men who were to remain at Cape Denison through the second winter, though none of them looked forward with much pleasure to a repetition of the blizzards. There was still, however, a considerable amount of scientific work to be done and the wireless was a great solace ; a budget of news enlivened breakfast and took the place of the morning papers at home. On February 23rd a message was sent to the Governor-General of Australia, and through him another message to King George, asking permission to name the new country between Adelie and Oates Lands King George V Land. The royal permission was received on March 7th, thus proving the value of wireless in Antarctica.

Winter conditions began, in 1913, a month earlier than in 1912, or in February instead of March, though the higher wind velocities were not reached until towards the end of the latter month. Dur-

ing the second year the velocities were higher than they had been the first season, and the wireless was put out of action for many weeks. From July 2nd to 12th there was no cessation of the atmospheric roaring and the hut vibrated like a violin. On the 5th a velocity of 107 m.p.h. was maintained for 8 hours and the maximum velocity was 116 m.p.h.¹ Mawson wrote: "These were the highest wind velocities recorded during our two years' residence in Adelie Land and are probably the highest sustained velocities ever reported from a meteorological station." The continual blizzards were a slow form of torture to the explorers and prevented any work out of doors. Mawson had discovered the windiest country in the world.

In the spring a large cross was erected on the summit of Azimuth Hill near the station, and the following inscription carved on a handsome tablet:

ERECTED
to commemorate
the supreme sacrifice
made by
LIEUTENANT B. E. S. NINNIS, R.F.
and
DR. X. MERTZ
in the
cause of science
A.A.E.—1913.

A short journey was begun on November 23rd, which was the earliest date permitted by the elements, when an attempt was made to recover the Eastern Coastal Party's specimens left near Mount Murchison. There was nothing, however, to mark the position of the depot beneath the snow, so the collection could not be reached. The Magnetic Polar Party's 76-mile depot was the next objective, but a blizzard held Mawson's Party up for seven whole days, and as the ship was then due, it was necessary to return to the station. The *Aurora* was seen just before midnight on December 12th and reached Cape Denison at breakfast-time next morning.

When Captain Davis took the *Aurora* into Hobart on March 15th, 1913, he had successfully completed his share of the first and

¹ The figures given here are uncorrected velocities from "The Home of the Blizzard."

principal part of this expedition, but his work was far from over. His leader was left behind at Cape Denison and Davis was in full command of the expedition—with empty coffers. The committee met him, at first, with the assertion that Australia could find no more money. The work already accomplished was paid for but there were neither funds nor the prospect of raising more for a third Antarctic voyage. Hence, the committee decided that the ship must be laid up for the southern winter of 1913, and Captain Davis was asked to visit England for the double purpose of reporting progress and attempting to raise further capital. This was the genesis of the Mawson Relief Fund, 1913.

Collecting money is seldom agreeable and Davis states that he would have given up his efforts as hopeless "had it not been for the kind assistance of Dr. H. R. Mill. . . . His keen enthusiasm and kindly sympathy . . . would have cheered the most despondent." On attempting once more to raise the financial wind, Sir R. Lucas-Tooth started the fund with £1,000, Mr. Lloyd George, who was then Chancellor of the Exchequer, granted another £1,000, the Royal Geographical Society, Captain Scott's widow, and Captain (now Rear-Admiral) E. R. G. R. Evans, each most generously gave £100, and the London total, with smaller donations, amounted to £2,627. When Davis returned to Australia in August he found that the Commonwealth Governments had granted a further £5,000 and that the sum of £8,000 from all sources was at his disposal for relieving Dr. Mawson and bringing the Australasian Expedition to a satisfactory termination. The *Aurora* was therefore refitted and repaired in readiness for her new campaign and sailed from Hobart on November 19th, 1913.

Macquarie Island was reached on November 28th and left again on December 6th, the ship arriving at Cape Denison on the 13th at 7 a.m. Mawson's Party was taken on board for breakfast, which was quite a historic meal. Davis says he found it difficult to realize it was actually Mawson who was telling them so quietly of the tragedy until, through the portholes, he caught a glimpse of the frozen plateau and could then picture the awful character of his struggle. After breakfast the occasion became still more noteworthy because of the absence of wind; and the sun was so warm that Mawson's party sat on deck to devour their letters and exchange further news.

The last chapter in the long record of research accomplished by this expedition now began. Instead of taking a short cut for

home, Dr. Mawson entered upon a most interesting and important phase of scientific exploration. Circumstances for once favoured his desires—thoroughly to examine the coast from the *Aurora*, beginning with the Mertz Glacier Tongue and working westwards as far as Gaussberg. All the collections, stores and equipment were on board the ship by December 17th, 1913. On the 18th to 19th the Mackellar Islets were surveyed and examined, and Cape Hunter, 8 miles to the west of the base, was next visited. Here were penguins, Wilson petrels and skuas, but above all was a second nesting-place of Antarctic petrels. Many eggs were collected; algæ, moss and lichen were found.

On December 23rd the hut was battened down and an invitation left for any visitors to make themselves at home there. The *Aurora* became the expedition's base; but a hurricane on Christmas Eve caused all efforts to be concentrated on the struggle for existence.

The wind averaged about 70 miles an hour with squalls of terrific violence. . . . Very high sea—cable and broken anchor hanging from the bow—launch washing out of the davits! We managed [wrote Captain Davis], to save the anchor and chain, but the launch and forward davit went overboard.

The launch was swept astern and they saw it no more.

The ship sought for shelter on Christmas Day beneath the cliffs of the Mertz Glacier Tongue and it was impossible to resume scientific work until December 28th when dredging was done and sea temperatures were taken. An attempt was made next day to round the northern end of the Mertz Tongue; this was prevented by heavy pack but there was every indication that its northern point on the western side had been reached. On December 30th, 1913, the oceanographical cruise westward began. Adelie Land was charted farther to the west than before and dredging was successful in 1,800 fathoms. The pack lay some miles to the north of its position on the two previous years, so that little could be added to the charting of the continent until the Davis Sea was entered.

Open water was reached here on January 19th, 1914, at a point less than 25 miles north of where the *Gauss*, of Dr. Drygalski's Expedition (1902), had wintered. The continent could be seen to the south and an easterly course was set for Drygalski Island, so named by Mawson, 80 miles away. This island had been sighted by the German Expedition from a balloon and then seen by Dr. Jones' Party in 1912, also from a considerable distance. It was

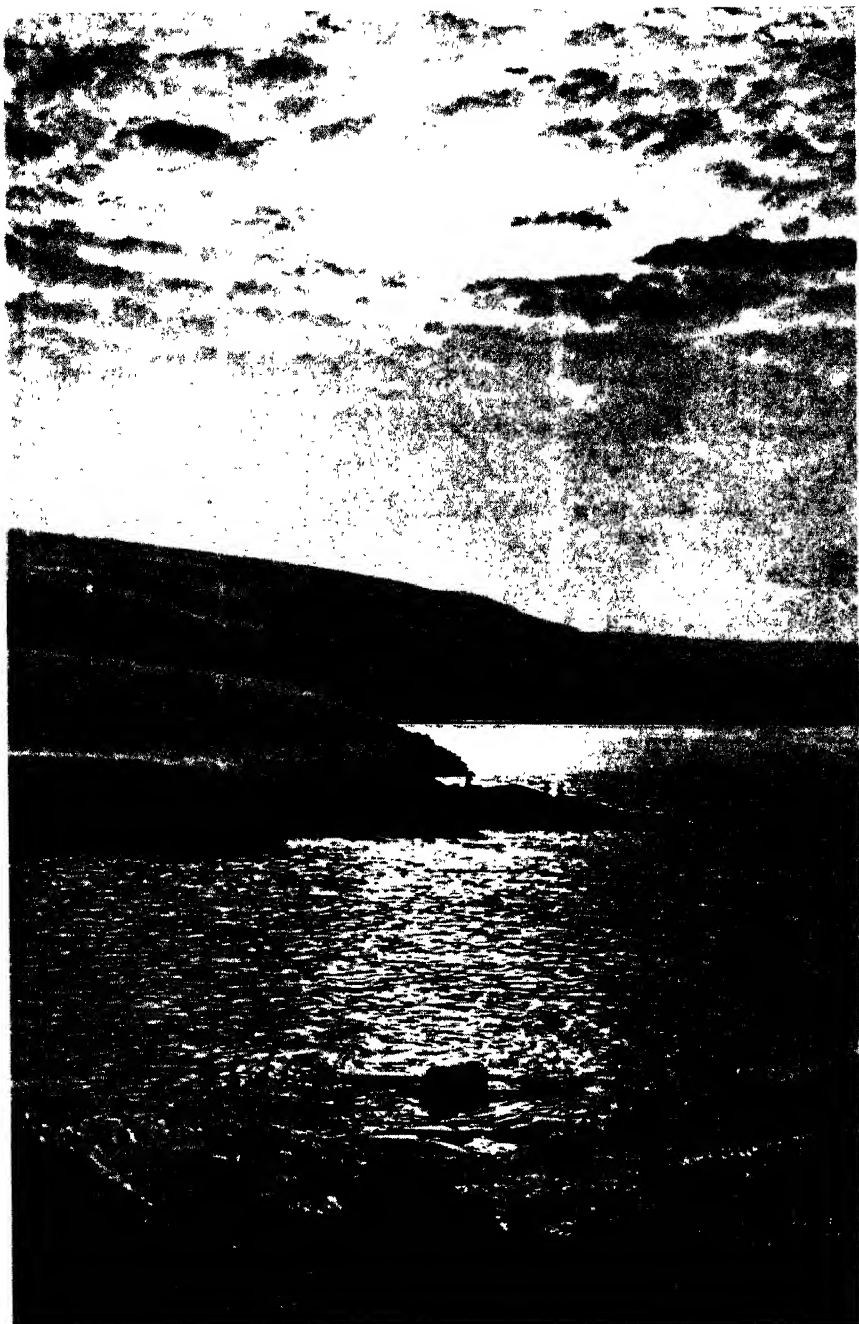


Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

THE ICE-GIRT COAST OF KING GEORGE V LAND LOOKING WEST
FROM CAPE DENISON

now approached to within 3 miles and nearly the whole of its south-western side was surveyed; its greatest length was found to be 9 miles and its height 1,200 feet. The land was completely covered with ice, like a flattened dome which terminated, at its edge, in cliffs of 165 feet average height.

A southerly course was then taken to within 8 miles of Haswell Island, and from here the crevassed slopes of Queen Mary Land were plainly seen. As many as six Ross seals were shot here on January 22nd, 1914, and then a north-easterly course was set for the Shackleton Shelf. A blizzard came down next day and the velocity of the wind exceeded 70 miles an hour. The log of Captain Davis for January 24th reads: "We are having a bad time; high sea; thick snow, and innumerable bergs." At 10 p.m. the shelter of the stranded berg, over 30 miles long, was reached and proved an excellent defence from the storm for three days, the time being spent in sounding and dredging. The whole Davis Sea had then been scientifically combed and a good collection of specimens made.

When the gale abated, the western edge of the Shackleton Shelf received attention and three inlets were discovered extending to the east and south-east. The northern extremity of Termination Tongue was completely investigated and charted. On February 5th, 1914, Drygalski Island was sighted again; and next day, on a northerly course, the ship passed through the pack in the same longitude as that in which the sea had been entered a fortnight earlier. This should be of interest to any future navigators of these waters as the main body of the pack had scarcely moved after four days' gale.

The work of this expedition was now over and the *Aurora* homeward bound. More geographical and scientific discoveries had been made than on any previous Antarctic expedition. Mawson wrote with relief: "Our work was finished, and the good ship was rising at last to the long swell of the southern seas." Adelaide was reached on February 26th, 1914, where a warm welcome awaited the explorers. Among the numerous receptions given in their honour, the Official Welcome must be mentioned, when His Excellency the Governor-General of Australia was present, supported by the Premier of South Australia, by representatives of the Commonwealth Government, the Chancellor of Adelaide University, Sir Samuel Way, and Professor Sir David Orme Masson of Melbourne University.

CHAPTER XI

HOMERIC DEEDS: SHACKLETON IN THE *ENDURANCE*

SIR ERNEST SHACKLETON exercised great restraint in recording his experiences on this expedition, knowing that some of his adventures would seem almost incredible. Since the publication of his "South," two of those who accompanied him have substantiated, as well as amplified, his statements in books of their own; and two others kept very full diaries that have been used in the following account.

When the excitement that succeeded the *Nimrod* Expedition had subsided, Shackleton was a "lion" of society with no need to foster popularity, and he refused the request of the Conservative Party to stand as a parliamentary candidate. Neither would he permit the story of his expedition to be published in a "Hero" series of books, for he hated to think that anyone should suppose he was claiming to be a hero. Early in the year 1911 he became infected with the virus of mercantile pursuits and nearly three years were wasted on wild schemes that he thought would be short cuts to prosperity.

The year 1912 was the Antarctic *Annus Mirabilis*¹ and he could no longer resist the call of the southern ice that had made him famous. Thus he made up his mind in 1913 to lead another expedition. Frank Wild had returned to London from Queen Mary Land, more than willing to accompany his old "Boss" again, and they spent a week-end on the Norfolk Broads together discussing the new plans. Shackleton had been brooding over a journey across Antarctica; the length of which, about 1,800 miles, would make it the greatest polar journey on record. He announced his intention in "The Times" of December 29th, 1913, and this brought 5,000 offers to accompany him, from which he chose fifty-six men. Frank Wild, Aeneas Mackintosh, George Marston, Ernest Joyce and Alfred Cheetham, old comrades of the *Nimrod*, joined up again. Frank Hurley and Tom Crean had also seen previous Antarctic service. Two new-comers are of interest: Lieutenant F. A. Worsley, R.N.R., a sailor of fortune after

¹ See Schedule No. 8, p. 294.

Shackleton's heart ; and Mr. J. M. Wordie, the Cambridge geologist, who became the principal scientist.

As this was to be a trans-Antarctic expedition two ships were considered necessary. The first of these, the *Polaris*, was a new vessel purchased in Norway and re-named the *Endurance* from the Shackleton family motto, and on Mawson's return the *Aurora* also was secured. Dr. H. R. Mill has given the financial history of this expedition,¹ and we need only notice here that Sir James Caird with splendid munificence subscribed £24,000, the British Government £10,000 and the Royal Geographical Society £1,000 towards the cost. Dame Janet Stancombe-Wills and others also gave generous help.

Shackleton's plan was to establish his Main Base in Vahsel Bay² on the Weddell Sea and make the principal journey from there by way of the Geographical Pole and the Beardmore Glacier to McMurdo Sound, if possible early in 1915. The first half of this route, from the coast to the Pole, beyond a distance of 5 miles from the Weddell Sea was, and yet is, entirely unexplored. Two other scientific sledging-parties would also operate from Vahsel Bay : one travelling eastwards towards Enderby Land and the other, Mr. Wordie's proposed Geological Party, westward towards Graham Land. A fourth unit would carry out scientific work at the station. In addition to all this, another base on the Ross Sea was necessary, from which a party was to travel across the Ross Barrier to the Beardmore Glacier, doing geological work there and meeting Shackleton's Trans-continental Party at Mount Buckley where, in 1908, he had discovered the first Antarctic coal seams. Depots would, of course, be laid by the Ross Sea Party on its outward journey to provide for the support of Shackleton's Party from the Beardmore to McMurdo Sound.

This was a bold scheme but, as his biographer said, "there was agreement on one point : if any man could carry through such an expedition, Shackleton was the man who could do it. He himself had no doubts." The greatest difficulty was the establishment of the Weddell Sea Base, for Filchner had shown the hazardous nature of operations in the neighbourhood of Vahsel Bay. Shackleton depended on dog teams for transport ; he took seventy dogs to the Weddell Sea and sent thirty to the Ross Sea.

¹ See "The Life of Sir Ernest Shackleton," 195-8.

² This name is retained, though Vahsel Bay ceased to exist when the ice broke out to form the larger Duke Ernest Bay. See Charts Nos. 1, 5.

From the beginning of the year 1914 preparations were being made for sailing south, and the offices of the Imperial Trans-Antarctic Expedition at 4 New Burlington Street were the centre of activity, directed with all his old efficiency by Sir Ernest. On July 16th Queen Alexandra visited the *Endurance* in the Thames, presenting Shackleton with a flag as well as Bibles for himself and the crew. On Saturday, August 1st, the ship was taken down the river to Southend and on Sunday to Margate. The Navy Mobilization Order on the eve of the Great War was issued on Monday the 3rd, when Shackleton immediately mustered all hands and said that he proposed, with their consent, to place ship, stores and personnel at the disposal of the Admiralty. All agreed and the offer was telegraphed at once. Within an hour the order "Proceed" was received, followed two hours later by a long and courteous telegram from Mr. Winston Churchill, First Lord of the Admiralty, in which Sir Ernest was thanked for his offer and told that the Government desired the expedition, which had the support of the scientific societies, to sail. The following day the King sent for Sir Ernest and handed him the Union Jack with the assurance that the expedition might sail with His Majesty's approval and good wishes.

The *Endurance* set out on her voyage, calling at Plymouth and Buenos Aires, with twenty-seven men on the ship, besides a stow-away, when Shackleton and most of his scientific staff had joined her in South America. Sir Ernest himself was Captain of the ship, Frank Wild Second-in-Command and Lieutenant Worsley Sailing Master. Buenos Aires was left on October 26th and South Georgia reached on November 5th, 1914. This island may have been discovered by Amerigo Vespucci in 1502; it was definitely seen by La Roche in 1675. The first charting was made by Captain Cook in 1775 when it was formally declared British territory. The island is 90 miles long by 20 miles wide and of a mountainous character; one of its peaks, Mt. Paget, is 9,200 feet high. Worsley said, on reaching here, that the trip began to be really interesting, little dreaming that before returning home he and Shackleton were fated to make some of the most thrilling pages of geographical history on these wild mountains and glaciers.

A month was spent at Grytviken in final preparation for the assault on the Weddell Sea ice, and the scientists made good use of their time by their surveys, researches and collections. The wireless was then in its infancy and there was no station on the island, though the *Endurance* was fitted with a primitive receiving set; but

no news ever came through and the progress of the war was unknown during the whole voyage.

We saw in Chapter VIII that the Weddell Sea presents great difficulties for navigation on account of its pack ice. The seasons vary considerably, and before the expedition left South Georgia the whalers brought in the bad news that the ice conditions in 1914 were unfavourable. In consequence of this Shackleton decided to winter the ship at his base, after the landing of the station, and definitely to postpone the trans-continental journey from early in 1915 to the southern summer of 1915-16. Assuming a safe and suitable landing, depots would be laid out on the route in March and September, 1915; and Shackleton never doubted that he could do what Filchner had done only two years before. Vahsel Bay was Sir Ernest's first objective for his station.

The ship left South Georgia on December 5th, 1914, passing between Saunders and Candlemas Islands of the South Sandwich Group on the 7th. The pack was entered and left again on this day and then coasted for about 300 miles in a south-easterly direction until December 11th, when the *Endurance* turned southwards and entered the pack in about latitude 60° S. For the first two or three days, while penetrating approximately a hundred miles of loose pack, the conditions were not exceptional. Then the ice became closer, making progress during the next ten days spasmodic and slow. On Christmas Day, after a fortnight in the ice, the net gain was about 350 miles. Immense floes had been met, as much as a hundred square miles in area. The scientific staff were more than usually busy while in the pack, Clark the biologist being much occupied with the small animal life brought up in his fine-meshed nets. Many soundings were taken and the bottom sample was invariably a fine glacial mud.

No progress was made in the first four days after Christmas. Then came a fresh turn of fortune and in 5 days the ship advanced about 250 miles. After this her progress was variable until early on January 9th when open water was reached in latitude 69° 47' S. This was about the same latitude as on January 2nd, but farther to the east. The passage through the ice had taken just four weeks and the point to point distance covered was almost exactly 600 sea miles or 10 degrees of latitude. A rolling ocean stretching to the horizon was entered and Shackleton laid a course south by east, hoping to make a landfall a little east of Coats Land, discovered by Bruce. The open water, crossed for a hundred miles, was dark

green in colour. On January 10th floating seaweed was seen and in the afternoon land was sighted. Mr. Wordie says: "It was a great sight—barrier and open water as far to the north-west as we could see." The position of the land agreed with that of Dr. Bruce's discovery made in the *Scotia* in 1904. Worsley states that the *Endurance* reached the ice face in latitude $72^{\circ} 34'$ S. and longitude $16^{\circ} 40'$ W. Wordie alludes to a curious feature in the shape of an undoubted high tabular berg enclosed in the land ice and standing some distance inland from the barrier cliffs.¹

There was open water, for the most part, along the ice cliffs, which varied in height from 40 to 115 feet, the average being about 100 feet. At one place, passed in the morning of January 11th, 1915, it would have been possible, Mr. Wordie says, to climb up to the surface of the barrier. The noon position was latitude $73^{\circ} 13'$ S. and longitude $20^{\circ} 43'$ W. on this day, and a sounding gave 155 fathoms on pebbles at a distance of 1 mile from the cliffs. Wordie wrote:

Shortly after noon up-swellings of land were seen far to the east: the barrier turned rather sharply here, so that a great bight exists, perhaps as much as 20 miles deep. . . . I make this land at least 18 miles off; the angle of elevation would make the height of the land about 2,000 feet. No rocks were visible.

About 80 miles of the barrier face had been coasted when, as the wind was from the west, it was not thought advisable to enter the bight and a course was set west-south-west until, the weather becoming thick, the ship lay-to.

She was under way again early on January 12th, and later in the day the *Scotia's* farthest was passed and Shackleton named his new land the Caird Coast in honour of his generous supporter, Sir James Caird. This coast began with a large ice tongue that was called the Stancombe-Wills Promontory, after another good friend, and which was low enough, in one place, to permit the landing of stores. This ice was much too far north, however, and so no stores were landed. The *Endurance* continued to survey the new coast, sounding and dredging as she went along. The promontory was not finally rounded until 7 a.m. on the 14th.²

¹ In 1917 Dr. Bruce showed Mr. Wordie his unpublished diary in which this feature had been noted on the earlier expedition.

² Shackleton wrote that this great mass of ice, at least 50 miles across, was afloat and destined to drift away. This prophecy may already have been fulfilled. See p. 252.

During the greater part of this day the ship lay-to and the scientists were very busy obtaining wonderful hauls of sea beasts. At 6 a.m. on Friday, January 15th, the cruise was continued, first to the south-east and then to the south-west, always close to the coast. Shackleton was now looking out for possible landing places, though he had no intention of going ashore north of Vahsel Bay except under pressure of necessity. Later in the day an excellent landing-place, like a natural quay, was seen in an opening named Glacier Bay. Shackleton afterwards said he had reason to remember it with regret, but 190 miles of rough country lay between it and his objective. There would have been a different story to tell had he landed here. Glacier Bay was so named because it was on the north side of a large glacier, 17 miles wide, which Shackleton named the Allan McDonald Glacier. The next morning (January 16th) the ship was held up by solid pack ice anchored among grounded bergs. The depth was 134 fathoms and the ice cliff clearly aground. In heavy weather the *Endurance* steamed back a short distance to the north and lay-to under the lee of a tilted berg.

The Caird Coast is faced with vertical ice cliffs from the top of which the continental ice ascends gradually to a height of 3,000 feet or more. Ridges, terraces, and crevasses in the ice sheet indicate irregularities in the land that lies beneath. This new country is of the same type as King George V Land, most inhospitable in appearance and characteristic of the greater part of Antarctica.

Shackleton then confirmed Filchner's discovery of Luitpold Land. The ship's position on Sunday, January 17th, was $76^{\circ} 22'$ S. and $28^{\circ} 39'$ W., with a depth of 136 fathoms on pebbles. On the 18th progress was erratic, and more than once a westerly course was made necessary by heavy pack. The position at noon was latitude $76^{\circ} 27'$ S. and longitude $29^{\circ} 58'$ W., 104 miles from Vahsel Bay. A landing, perhaps the next day, was confidently expected and preparations made accordingly. In the late evening it began to blow from the north-east and the ship lay-to among small floes. On January 19th the ice packed tightly round the ship and nothing but sounding and dredging could be done. Wordie wrote: "The Boss was . . . on the fo'c'sle head with a ready-made dredge of his own; altogether he had a sugar tin, some gauze round a dog-muzzle, and a hemp tangle; he brought up finally some invertebrates and some pebbles."

The *Endurance* was first caught by the ice on that day in latitude

76° 34' S. and longitude 31° 30' W. In the next week she was carried, first to the south-west and then to the north-west; she was only 60 miles from Vahsel Bay on January 24th. Six weeks later she was even closer to land, for on March 14th the Filchner Barrier was only 40 miles off, and then the pack swung her away.

It took some time to realize that the ship was hopelessly beset. On February 14th and 15th strenuous efforts were made to cut a channel through the ice to open water lying about half a mile distant. This channel, several hundred yards in length, was cut through young ice; but efforts were unavailing against the heavy pressure ice beyond. There was no doubt, before the end of February, that the *Endurance* would have to winter in the pack; and on the 24th of this month she was transformed into a wintering station. Nautical routine and sea watches were abandoned, not to be resumed for the next eight months. Thick winter clothing was issued, and the hold of the ship—the warmest part of the vessel—was utilized as the principal living-room with the title of the “Ritz.”

During the period from the besetment to the abandonment of the *Endurance*, life on board was uneventful except for the scientists who found ample work of an interesting character. Their oceanographical researches, on a course approximately parallel to, and westward of, the *Deutschland's* course, were of considerable importance. Both these ships traversed previously unknown waters. Fresh meat was secured from seals and penguins whenever possible and, as a result of this, there was no case of scurvy throughout the expedition. The dogs were broken in to the sledges and several exciting races were held. On March 3rd there were sixty-two dogs and four puppies in kennels on the floe. Football and ice hockey were much appreciated. Smoking concerts, led by Hussey with his banjo, were frequent.

The ship had drifted 95 miles in a north-westerly direction by March 31st, 1915, and the ominous murmur of distant pressure was heard for the first time at the beginning of April. On the 9th young ice was piled up to a height of 11 feet astern of the ship. This movement was not serious, wrote Shackleton, “but I realized that it might be the beginning of trouble for the expedition,” and measures were taken in readiness for the danger. Darkness and cold advanced without any effect on the health or spirits of the men; the food was excellent, ample and varied. On May 2nd the ship's position was in latitude 75° 23' S. and longitude 42° 14' W.

In this month the floe in which the *Endurance* was embedded was 3 miles long and $2\frac{1}{2}$ miles wide. During the early part of the month there was an interesting return of animal life. It was not until July that the ice began to press its attack on the ship. On the 21st of this month it was seen working, and pressure ridges were forced upwards as high as 15 feet.

Commander Worsley's and Mr. Wordie's diaries will now be our principal guides. On Friday, July 23rd, the latter wrote :

The last twenty-four hours have been full of anxiety. . . . Just as we had finished lunch the Skipper (Worsley) rushed down to say that there was a crack away on the port beam. We went on deck to find that the crack was only 40 yards away. . . . All loose gear, picks, shovels, etc., was at once brought on board.

The following morning an emergency stack of provisions was placed on deck in readiness for a sudden abandonment of the ship, should it be crushed by the ice. There was very heavy pressure only 300 yards away. "Our long months of rest and safety," wrote Sir Ernest, "seemed to be at an end, and a period of stress had begun." This was the time for Shackleton to assert himself and he awoke like a giant refreshed with wine, determined to keep up the spirits of his followers and, with God's help, eventually to save them.

On July 26th the ice was quieter and the sun reappeared after seventy-nine days of absence. On Sunday, August 1st, 1915, when the *Endurance* was in latitude $72^{\circ} 26'$ S. and longitude $48^{\circ} 10'$ W. Mr. Wordie wrote :

A loud crack was heard and the ship seemed to heave in her berth. . . . Dogs were hurried on board and tied to the ship's rail ; sledges and loose gear were thrown on deck. . . . The gangways were pulled up and we stood a minute or two watching developments. Soon the ship took a list to starboard, and we knew that she was breaking out of her berth. The boats were cleared . . . so that they could be dropped on the floe at any moment.

The *Endurance* had withstood the first attack of the ice very bravely, and the month of August passed without further danger. Towards the end of the month the pack began its second attack very gradually and caused the ship's timbers to groan and creak. There was some movement in the floes throughout September and the distant roar of pressure could often be heard. Occasionally the edges of an ice field were seen crumpling up, but the ship herself was not threatened until September 30th when her

mortal enemy gave her one ominous squeeze and let her go again. This little hug, which seemed like play on the part of the pack, caused one of the bulkheads to bulge several inches. Then nothing more happened for a fortnight. The ship's position on October 3rd was latitude $69^{\circ} 14'$ S. and longitude $51^{\circ} 8'$ W.

On October 14th the third round in the grim contest opened between the ice and the ship. The *Endurance*, until then slightly tilted by the ice, fell back into the water with a bump. She had been resting all her weight on the pack since August. On Sunday, October 17th, Commander Worsley wrote:

Pressure on the ship increases. . . . The iron plates on the floor of the engine-room buckle up and over-ride with a loud clang. The ship stands it nobly for nearly an hour, and at last with a series of heavy jerks and jars she starts to rise.

The following day, Wordie says:

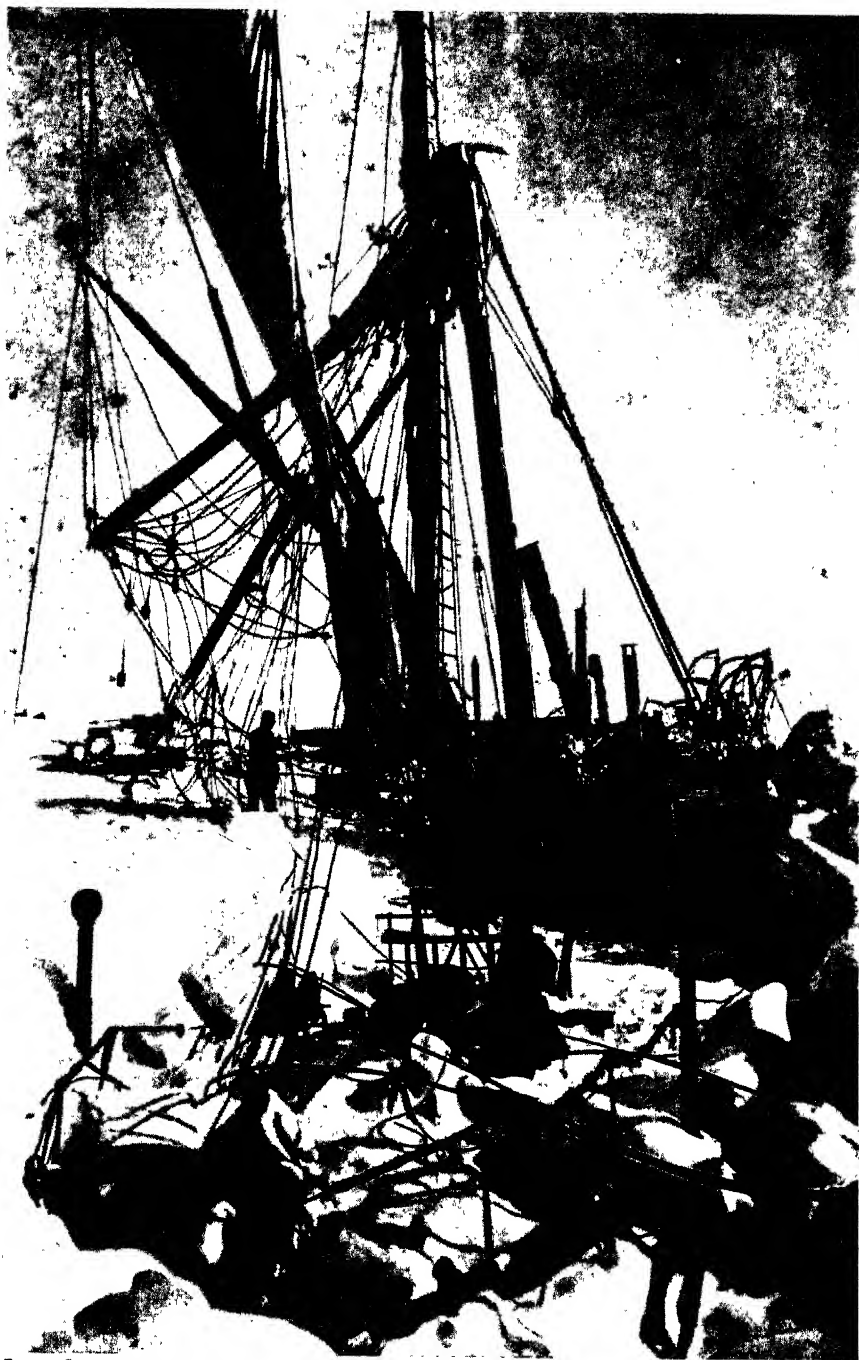
There came more pressure so that she lay right over almost on her beam ends on the ice. . . . At 4.45 p.m. slowly but surely the ship heeled right over to port; all sorts of weird noises came from the engine-room, and then with a rush all the unsecured dog kennels slip down to leeward. . . . The list was fully 30 degrees.

The pressure was relieved gradually and at 8 p.m. the ship was afloat and nearly upright. She was then moved into what was hoped would prove a safe position.

The end, however, was now very near. On October 25th Wordie wrote:

Pressure started on the port side. . . . All gear brought on board at a quarter to seven. The pressure was now getting worse. The floe ahead, i.e. to the N.E., was going across our bows and screwing the ship. . . . The ship seemed to be driven back by the floe ahead. . . . The rudder post came away from the planking on the starboard counter—we had developed a serious leak. In a few minutes we were preparing for the worst. . . . Clothing and sledges were now being passed up on deck and any sledging provisions not already there.

Night and day the struggle now went on to prevent the ship from filling with water. Wordie wrote on the afternoon of October 26th: "Any further pressure in our present position would be extremely dangerous. About lunch time to-day some sounds were heard, and everyone jumped with apprehension, but fortunately it came to nothing." This respite was short, for the last hour of the *Endurance* had come.



ROYAL GEOGRAPHICAL SOCIETY]

THE WRECK OF THE *ENDURANCE*

Strong shearing pressure, in fact, began again that evening. Sledges and camping gear were put on the ice. The leak got worse and every now and then the ship was given a fresh squeeze. The worst pressure started at 2 p.m. on the 27th and then the water began to gain on the pumps.

The attack of the ice reached its climax at 4 p.m. The ship was hove stern up by the pressure. . . . The decks were breaking upwards and the water was pouring in below. . . . At 5 p.m. [wrote Shackleton], I ordered all hands on to the ice. The twisting, grinding floes were working their will at last on the ship. It was a sickening sensation to feel the decks breaking up under one's feet, the great beams bending and then snapping with a noise like heavy gunfire. The water was overmastering the pumps, and to avoid an explosion when it reached the boilers I had given orders for the fires to be drawn. . . . Just before leaving, I looked down the engine-room skylight as I stood on the quivering deck and saw the engines dropping sideways. . . . I cannot describe the impression of ruthless destruction that was forced upon me. . . . The floes, with the force of millions of tons of moving ice behind them, were simply annihilating the ship.

Commander Worsley wrote in his diary that night :

First night on floe. . . . Shortly after we had camped . . . we could hear the crushing and smashing up of her beams and timbers, and subsequent examination of her showed that only six cabins aboard had not been pierced by floes and blocks of ice. The whole of the forecastle and Ritz were submerged, the wardroom and every one of the starboard cabins were driven through by ice.

The *Endurance* had drifted a point to point distance of 573 miles in the 281 days since being beset, but the sum of the courses based on the observed positions made the distance 1,186 miles, or about 4 miles a day between the daily positions. When the ship was abandoned the nearest shelter was at Snow Hill Island in Dr. Nordenskjöld's hut, 312 miles to the north ; but there were more stores on Paulet Island, 34 miles farther away. Snow Hill Island was near the larger James Ross Island, and Robertson Island was still nearer the wrecked ship. The first intention, therefore, was to make a sledge journey to Robertson Island.

In preparation for the journey every useless article had to be abandoned and things had a very different value from that in civilization. An ounce of food was a necessity, whereas a sovereign was a useless burden. As an example of this, Shackleton threw away his gold watch, gold cigarette case and a handful of sovereigns. The men followed by discarding everything except the barest necessities. As Worsley said, it was Shackleton's

knowledge of men, quite as much as his executive ability, that made him such a wonderful leader. It was characteristic of him that when he ordered all superfluous weight to be cast away, he delighted the heart of Hussey, the meteorologist, by allowing him to keep his banjo.

On Saturday, October 30th, 1915, Wordie wrote:

We have started on the great journey. The pioneer sledge (Boss, Hudson, Hussey, and self) got away about 1.15 p.m., the Boss shouting out, "Now we start for Robertson Island, boys!" (to which all hands raised a cheer). Made 1 mile N.W. 200 yards. . . . A day of drifting snow.

On Sunday, the 31st, only three-quarters of a mile was made, so on November 1st there was

a complete change of plan. . . . We moved to Ocean Camp . . . and here we will stay [said Wordie], providing the floe does not break, till the summer leads form and we can take to the boats. (This may not be till several months are over.) . . . The dog sledges went back to the ship and brought up all the available food.

This attempt at sledging to land proved impracticable. Only 4 miles had been accomplished in as many days; but the moral effect of the effort, at that time, and of moving out of sight of the wreck, was beneficial. Ocean Camp was established on a very thick floe.

From the beginning of November we have the hitherto unpublished diary of Sir Ernest Shackleton to guide us until the launching of the boats, five months later. This diary is of great value and interest and will now be followed in addition to the diaries of Commander Worsley and Mr. Wordie.

1915. *November 1st, Monday*: Strenuous day. Snowing hard all morning. Cleared about 10 a.m. Hurley, Wild, Worsley, self went end of floe on high pressure. Black outlook. Nothing but sea of pressure, impossible advance. Grave consideration. Decided stick this floe, chance drift to North. Get all possible from last camp and ship, bring up other boat. Teams working splendidly. *2nd, Tuesday*: Nearly all hands away at ship cutting out stores, fishing in the cabins through the ice. Hurley gets his negatives. Shot three seals. Hoisted King's flag. . . . Wild leads salvage party. Hudson gets down into after hold, opens deck hatch, two cases of milk float up. Have food for 180 days at 1 lb. per day exclusive seals we get. Plenty tobacco here for men's use. Conserving matches. *3rd, Wednesday*: All day party at ship shifting wood and stores to make things easier here. . . . Ship looks awful. . . . Trying to cut through deck and reach stores in hold through water. Hands been employed making big mess tent. Hoosh seal and blubber excellent. Queen's Bible. Banjo Hussey.

Sir Ernest was happy when he heard the strumming of the banjo across the floe in the evenings because it helped to keep up the spirits of the men. He knew that monotony was more to be dreaded than danger. We return to his diary.

November 4th, Thursday: Fine and fortunate day. Broke into Billabong [one of the cabins], rescued stores. 1st, float barrel of nuts, next case sugar, loud cheers, next soda crystals, groans, then jam. 2nd, break-in flour comes up. . . . Wild got $3\frac{1}{2}$ tons of stores essential. Wood floors to tents. 23rd Psalm. Fine. *5th, Friday*: Fishing in Billabong. Thirty-eight cases flour. Jam enough for a month's food. All sorts of clothes coming out. Set night watches one hour each man. Tents seem all happy. Got fresh onions: good hoosh. . . . *6th, Saturday*: Cook burnt hoosh as bottom fell out of pot. Decided to have full rations till end January, then if ice not North abandon boats and make for shore. . . . Everyone very cheerful and happy.

Worsley wrote on this day: "Sir Ernest holds a council of war" at which it was clear that a winter on the floe must be avoided at all costs, "running the risk of the ice opening and crushing the boats some dark winter's night, not to mention the hardships and misery of spending a winter on a treacherous floe with our depleted resources." Hence it was decided to try to march for the land.

Shackleton wrote:

November 8th, Monday: Beautiful day. All hands digging out sledges, boats from drift, squaring up camp. Hurley, Wild, self, went to ship. . . . Rescued cocoa, Beauvais pemmican, looking-glass. Had a wash to-day. *9th, Tuesday*: Working all day on fixing camp up. Sealing parties out. Cook makes brown cakes. Hurley finishes negatives two petrol tins full.

This was the selecting of 120 negatives; about 400 had to be destroyed. The diary continues:

Lees' stores look like village shop. Look-out tower built. Everyone fit and cheerful. Banjo going to-night. *10th, Wednesday*: Sealing parties five seals. . . . Plenty of meat now for 10 days. . . . I salvaged my sponge from ship, also chronometer. Cook successful bannocks.

Saturday, November 13th: "Petrels about. Hoosh midday, choice of Virol, Lax, Sardines. . . . Bannocks excellent." Day after day Shackleton made similar entries in his diary, from which only the more interesting examples will be selected.

November 15th: Looks as though current was working North at last. Wild with Carpenter went to take gunwale off motor boat to raise whalers. . . . Mustered all hands at 2.30, read out emergency stations. *18th, Thursday, 3.30*: dogs woke us, young seal came to camp. Wild shot it. . . . Two Emperors came to us—killed for hoosh. Finished Eothen. Reading Collinson. *21st,*

Sunday: The event to-day. I was standing by Hurley's sledge at 4.30 saw the funnel dip behind a hummock suddenly. Run up the look-out. At 5 p.m. she went down by the head. The stern the cause of all the trouble was the last to go under the water. I cannot write about it.

22nd, Monday: Made out list of people for the two boats. Everyone cheerful. Good hoosh. Calculate out weights 5 tons and $\frac{1}{4}$ which boats ought to easily take. *24th Nov.*: Wild, Hurley, Macklin went to where the ship went down, (ice) all broken up. . . . Have had touch of lumbago to-night. . . . Ham fried, breakfast. *Monday, 29th*: Brilliant sunshine. . . . Men making canvas bags to save weight in carrying flour. . . . Good hoosh always now.

For about a fortnight Shackleton had sciatica and made very brief entries in his diary. On December 15th he noted that they were then 234 miles from Paulet Island and thought of marching towards Graham Land which lay to the west. The rate of drift had been so slow, only 60 miles during November, from point to point, and not much more than 100 miles in the first two months since camping on the floe, that it was decided to attempt a second sledge journey with the boats. We return to Shackleton's diary.

December 20th: Went out with Wild and Hurley to prospect possible road to move. Found several good floes. Decided to go to-morrow for long run and see if we could make 2 miles a day. *21st, Tuesday*: Wild, self, Hurley, Crean, went 6 miles out, found that we could make progress to W. so decided to start the night after to-morrow. Everyone seems pleased. *22nd, Wed.*: Christmas Day kept, gorgie.¹ Very hot. Preparation for going away. Free run of food for all, duly taken advantage of. All cheerful. Make a good Christmas.

23rd, Thursday: Made a start to-day. Did $1\frac{1}{8}$ geo. miles. Now camped on old floe. *24th, Friday*: Held up open water at 11.30, camped. 9 a.m.: Wild, Worsley, Hussey, self sought way but hopeless. Two sledges went Ocean Camp brought gear and extra cooking pot. Way bad. All cheerful. *25th, Sat.*: Christmas. Started 2.45 a.m. Camped noon for dinner. Heavy surface, all doing well. Curious Christmas. Home thoughts. Seal steak and tea. The dogs are marvels. *26th, Sun.*: Went up small berg saw good floes N.N.W., returned to camp very hot having pioneered the way for 2 days. Had hoosh and turned in noon. Will march to-night at 8 in cool. *27th, Mon.*: H. and self went on to pioneer a road. Have made a good one for $2\frac{1}{2}$ miles N.W. . . . Had good seal hoosh and Virol. Turned in then. This is slow work. . . .

28th, Tues.: Under way just after 9 p.m. . . . From top of a height saw disintegrating ice. Returned to camp 7 a.m. Turned in but did not sleep. Thought the whole matter over and decided to retreat to more secure ice: it is the only safe thing to do. Twenty-four hours' sleep now. Am anxious,

¹ Mr. R. W. James who was in Shackleton's tent spells the word "gorgy" and writes: "A word, invented in our tent for an orgy of food, which tickled Shackleton's fancy."

for so big a party and two boats in bad condition we could do nothing. I don't like retreating, but prudence demands this course. Everyone working well. . . . Wild always same. 29th, Wed.: Make a run to the N.N.E. in the hope of finding another way. . . . Found the ice all breaking up. . . . Returned to camp . . . put up recall flag and move . . . on to flat old floe. Reduced stores . . . and got things in order. We are 10 miles from Ocean Camp but in a much better position.

A period of waiting then ensued. Occasional excerpts from Sir Ernest's diary will show the conditions under which his party passed the next three months.

January 9th, 1916: Anniversary of our farthest South last expedition. What a change in fortune. I am growing anxious now with all this party. *Jan. 14th*: Decided in view shortage of food to shoot the dogs. Wild shot four teams: death instantaneous. Hurley, Macklin left at 6.30 to try and reach Ocean Camp for more food. *15th*: Hurley and Macklin arrived at noon. Only reached Ocean Camp at 4 a.m., very tired, soft going. . . . They got some welcome additions to our stores. *Feb. 1st*: 65° 16½' S., 52° 4' W. No news. S.E. wind. Fine weather.

Patience

Patience

Patience.

Shackleton and others in his tent played Patience in the afternoons and they agreed that the word was the keynote of their life in the pack; hence the camp became known as Patience Camp. Day succeeded day with monotonous reiteration of meals and sleep. A shortage of blubber made it necessary to cut down hot meals for two days, when ample game again was killed.

Probably the most critical period of the expedition as a whole was now approaching, due to the gradual break-up of the ice as it approached the north end of Graham Land. On March 9th, a faint swell, which gently moved the ice, was noticed. A month before the boats could be launched, the floe on which the camp was situated became temporarily isolated in a large lake about two miles in diameter. A few days later, on March 18th, the pack was pressed up all round them again. On the 23rd, Shackleton was the first to sight land, after a whole year without seeing it; and in the afternoon of the same day a mountain range came into view. This was Joinville Island, about 50 miles to the west of the camp, but unattainable because the drift of the pack was more rapid than the progress of the party would be if they attempted to reach it. The only safe course was to remain on the floe till the boats could be launched.

On March 30th there was a pronounced swell, the ice became restless, and several cracks formed. The pack was very mobile during the following week and moved rapidly with every wind. There was a slight swell again on April 4th and 6th when the floe on which the tents stood swung round through an angle of 180 degrees. On April 7th, 1916, the peak of Clarence Island came into view to the north, whither the pack was carrying them, and next day Elephant Island was sighted. Shackleton realized that beyond these islands to the north there was no refuge for his shipwrecked party. It is true that there were many other islands of the South Shetland Group to the west, but they were farther away and the prevailing winds were from that very direction. These were anxious days for Shackleton, though he never showed his feelings.

Mr. R. W. James writes of this time :

In Bransfield Strait the drifts were at first westerly. . . . About half-way across a rapid easterly drift began and when we at last saw the islands and could estimate the drift from their change of bearing we saw how rapid it was—16 miles a day, perhaps. This of course was very disquieting because we looked like being carried to leeward of the Elephant Group before the ice broke up and let us out. Actually the break-out came only just in time. I was taking positions and was also in the Boss' tent and so knew how things were. . . . It was a race between the drift and the break-up, with our fates as counters.

With the disintegration of the pack began a time of danger. The ocean swell broke up the floes into smaller pieces and the channels between them were frequently filled with loose brash ice crushed by the larger masses. No boat could with safety be launched in this. On April 8th there was a very heavy swell and a crack formed across the camp that night. Next morning the tents were struck and everything was packed in readiness for flight when navigable channels should appear. At 11 a.m. the floe was split across and all hands waited on the larger portion, making the best use of their time by eating as much meat as possible, for they had more of this food than the boats could carry.

At 1 p.m. on Sunday, April 9th, 1916, it was possible to embark and Shackleton seized the opportunity, though the conditions were by no means all he desired. The three boats made their way through a mile or two of channels, the men singing at the oars with gladness at their escape from the ice. Thus they entered a large pool ; but their joy was turned into consternation at the sight of a huge mass of broken ice and foam like a tidal rip, that was bearing down upon them. Destruction seemed imminent as they

strained every nerve at the oars to escape. This they did, by the narrowest of margins, for the third boat was nearly caught.

Twilight came on as they sought a camping site for the night, and just before dark a suitable piece of ice was found rocking in the swell. The boats were hauled up, camp was pitched, and the blubber fire soon burnt cheerfully in the darkness. Hardened to danger, the men laughed as they ate their supper; and Shackleton wrote, when the meal was over, that snatches of song came to him as he wrote up his log. In two hours' time all had been rocked to sleep except Sir Ernest and the night watchman. That "intangible feeling of uneasiness," as Shackleton described an intuitive warning of danger that never seemed to fail him, turned him out at 11 p.m. He was walking across to the watchman when the floe cracked beneath his feet. The rupture extended underneath a tent and a sleeper enclosed in his bag was dropped into the sea. Sir Ernest threw himself down, seized the unfortunate fellow and lifted him on to the floe. Commander Worsley writes:

A second later the two halves of the floe, immediately where the man had been, came together with a terrific thud. . . . The rescued man began to rummage in his sleeping-bag, and presently was heard to mutter, "Lost my — tin of tobacco." Said one of the others to him, "You might have thanked Sir Ernest for saving your life." "Yes," replied the dripping sailor, "but thanking him won't bring back my tobacco."¹

When everything had been moved to the larger part of the floe, Shackleton was seen on the smaller piece disappearing alone into the darkness as the current bore it away; but Wild immediately launched a boat and ferried him back. There was no more sleep that night. The roll was called and the tents were struck; then the blubber stove was rekindled and hot milk served out. Pipes were lighted and contentment came while they awaited the breaking of day.

Monday, April 10th, dawned at 6 a.m. and half an hour later hot hoosh was ready, after which the whole party embarked. Mr. Wordie's diary takes up the story:

We got under way at 8 a.m., a strong E. wind making it none too pleasant. . . . We only had open water till midday; then a thin tongue of pack made us go several miles west. Finally we got through, only to find the water too rough and stormy: so we retreated and hauled up on an isolated old pressure floe in our rear at 2 p.m. We only hope it will last out our stay without cracking.

¹ "Endurance," 66-7.

Everyone was so tired that a good night's rest was obtained, though the floe they slept on was being undermined by the swell. The floe was about 50 yards long by 35 yards wide, with its highest point 15 feet above the sea. The morning light showed that they were surrounded by small floes, closely packed and rocking about in a heavy swell which threatened to break up their floe and at the same time prevented them from leaving it. The whole party was in imminent danger for eight hours. Wordie said: "Boats could not live among heaving ice like this: it was swaying like a switch-back, and spray would dash over some of the floes."

Commander Worsley then wrote that, at 2 p.m., a small opening occurring we got away in a hurry, but could only make 2 miles before dark, being nearly jammed on a lee shore towing the *Wills* off with the *Docker*.¹ At dusk made fast to a heavy floe, landed the "galley," boiled milk, had supper, then had to cast off, for loose pieces worked round the floe. Dodging under lee of small patches of pack all night. A cold wet rotten night. All hands wet by snow and rain showers.

Wordie adds:

Whales seemed to be continually blowing round us during the night. Then later in the night both the wind and the swell began to go down. A slow course began to be made to S.W. . . . The sky cleared and the stars came out. Wednesday morning (April 12th) came in with a beautiful red dawn. The swell had gone down; everything was quiet and peaceful. . . . So that morning we sailed in the sunshine feeling that all was well: our clothes dried on us and things seemed good.

The noon position, however, showed that there had been a "tremendous drift to E. in spite of working to S.W.," and it was driving them out to sea.

They had failed to make progress and the unexpectedly strong currents made the situation most serious for boats unable to sail to windward. Worsley writes:

As we stand on S.W. towards dark we find long streams of pack that we cannot weather and to avoid being caught between them in the dark we make fast to the largest isolated floe we can find. Unfortunately it is not large enough to give much shelter, and coming on squally with a rough choppy sea we are unable to land the "galley" and boil the milk with a Primus. The *Dudley Docker*'s painter is fast on the floe and the *J. Caird*'s close to it. The two boats hang alongside for supper with the *S. Wills* astern, but bumping and chafing too much she is slackened astern of us. Just after this, about 8 p.m., the wind suddenly shifts to S. (or S.E.?). This drives the boats broadside on to the

¹ This boat was the *Dudley Docker*, named after Mr. Dudley Docker, whose generosity enabled Sir Ernest to complete the purchase of the *Endurance*.

jagged edges of the floe, and to save them being smashed up in the darkness we are forced to cut the painters and lose much valuable rope. Lie-to all night in the open sea. We have the *James Caird* fast astern and the *Stancombe Wills* astern of her, and most of the night we pull ahead with two oars towing two boats, thereby keeping the three boats from bumping together. Incidentally it keeps us from freezing.

The change in the wind to the south-east, like the break-up of the pack before the current had driven the party upon it out into the open sea, was another fortunate event that may have prevented a disaster. Mr. James writes :

At noon on the 12th the position showed us to be perhaps 30 miles farther from land than when we had started, and worse still, to leeward. We had gone east although we had been definitely sailing west. . . . It was perhaps the grimmest moment in the expedition for those who knew of it, though it was not made quite public property at the time. The party had had all the exposure and lack of sleep of the last days and seemed to have gained nothing at all. . . . The complete change of wind during the night was our salvation.

Mr. Wordie takes up the tale :

On Thursday the 13th we got under way almost before daylight. Our course was clear, to run before the wind to Elephant Island. The sea was not nearly so rough and I believe we must have made as much as 30 miles in the right direction : it was cloudy all day and no position was obtainable. For 3-4 miles we sailed due N.W. through a maze of bergy bits. . . . By now we had left the pack and were in the open sea. . . . In the afternoon the sea became much rougher, the water froze on the oars and sides of the boats. We were in an awkward position, no water and a very hazy idea of our locality. In the evening the *Docker* put out a sea anchor,¹ and the other boats rode after her. . . . When it turned out so stormy the Boss gave orders for the different crews to help themselves : no stinting of food, so that their strength might be kept up. And so we settled down to a very cold stormy night.

The want of water was due to the suddenness with which the boats had won clear of the pack ice. They had been accustomed simply to melt ice as required ; for pack ice, though formed from sea water, freshens after a time. The boats found themselves in open water without the water breakers being filled. James described Thursday night as ghastly and Wordie as terrible. The latter continued :

A slippery iced oar was lost on the *Wills* and one man went overboard, having slipped on a frozen thwart : he was lucky enough to be pulled on board again before the ships drifted away from him in the dark. About 5.30 a.m. on Friday (the 14th) whilst in a drowsy state, I could hear those on deck saying that

¹ This is a triangular canvas bag from which a boat will stream out and keep head to wind.

land was visible to the N.W. . . . As the daylight strengthens we see the lofty peak of Clarence against the sunrise to the N.E. A little later Elephant Island shows cold and gloomy to the N.N.W.

At 7 a.m., Wordie continues,

it had developed into a glorious morning. . . . The various boats . . . came up to each other and exchanged greetings. Everybody was smiling—land in sight and bright sunshine. . . . The wind had now gone S.W., and soon fell very light, so that sails were useless. So we fell to on the oars in spells of one hour on and one hour off. Elephant Island was our mark—30 miles distant. But the rowing was none too brisk—we had no water, had been twenty-four hours without a drink. . . . We had stopped making any headway at all about 6.0; a current seemed to be driving us off the land, towards the E. The wind went N.W., and things looked pretty black: ten hours' rowing had brought us only within 8–10 miles of Elephant Island.

The only course now open to them was to try and make the north-east point (Cape Valentine) of Elephant Island under oars during the night; but worse conditions were experienced than on the previous night. When darkness fell the wind was from the north-west and it seemed almost impossible to make the Cape. If they passed it to leeward, their last chance of land was gone. At 7 p.m. their fortune turned; the wind backed to the south-west and strengthened, so a course was set for Cape Valentine under sail. They held on all night, sailing as close to the wind as possible. The *Caird* had the *Wills* in tow; the *Docker* was in close company at first, but then got separated and gave rise to some anxiety for her safety. The night was very rough and much water came on board the boats.

Mr. James continues the narrative:

In the early morning of the 15th (Saturday), just as it was getting light, there was a certain amount of thick weather and a discussion took place between Shackleton and Wild as to our whereabouts. Both thought we must be somewhere near land and Shackleton was for putting out to sea for safety. Wild, on the other hand, thought that we should keep what we had gained. During the discussion the mists cleared and we saw the cliffs of the island apparently right on top of us. Even then we were not sure of our position, but Wild gave it as his opinion, which turned out to be correct, that it was the east point of the island which we had just managed to grasp as the storm drove us past. We got rather out of the wind in the lee of the land along the east coast, but found no landing-place until Cape Valentine was reached. There it looked possible, and Shackleton went in, in the *Wills*, to have a look. He came back and said it was all right: "Nothing very much, boys, but a bit of God's good land" were his words so far as I remember, and so it seemed to us. Just as we were landing the *Docker* turned up, making for the same beach a most tremendous relief to everyone.

Commander Worsley thus describes the *Docker's* experiences after her separation :

Friday, 14th, to Saturday, 15th April, 1916 : S.W. gale, 6-8. The wind . . . by midnight was blowing a gale with snow squalls and a dangerous lumpy sea. . . . About midnight we lost sight of the *Caird* with *Wills* in tow, but not long after saw the light of *Caird's* compass which they were shining on their sail as a guide to us. We answered by lighting our candle under the tent and letting the light shine through. . . . Our poor fellows lit their pipes, their only solace, as our raging thirst prevented us from eating anything. By this time we had got into a bad tide rip which, combined with the heavy lumpy sea, made it almost impossible to keep her from swamping. As it was we shipped several bad seas over the stern as well as abeam. . . . It was now so thick with snow and spindrift that close to we could see nothing of the land. Added to this, constant peering to windward to watch for seas striking us appeared to have given me a cold in the eyes, so much that I could not see or judge properly and was constantly falling asleep, momentarily, at the tiller. About 3 a.m. Greenstreet made me lie down while he took the tiller. I was so cramped from the wet and the constrained position one was forced to take on top of gear at the tiller, that the others had to pull me amidships.

Mr. Wordie wrote on Sunday, April 16th :

We landed on the N.E. point of Elephant Island yesterday, all dead tired after four very anxious nights in the boats, especially on Thursday and Friday, when there was very great danger of not only the *Stancombe Wills* but also of the *Dudley Docker* being swamped. . . . It was a big relief to know that all three boats were here without a man lost. The Boss said little. . . . Hot milk was going very soon after we landed. . . . We had got a footing on the land but not much more. Three shingle beaches are backed by steep cliffs and screes, up which there is no escape should a storm come. . . . A big meal of seal steaks, and then we turned in shortly after 5 p.m. Hourly watches had to be set in case of a high tide.

Our first job on landing [writes Mr. James], after a drink and some food, was to pull the boats really high up the beach. Shackleton naturally saw to this. Then the tents were pitched, which took a very long time for we were quite silly with want of sleep. Shackleton turned in when the tent was ready, giving orders to Hurley and myself that he was to be called to take his hour's watch—an order which, needless to say, we disobeyed. As he lay in his bag he asked me to get him a drink, which I did, but he was asleep before I got back with it.

Mr. Wordie continues the story :

One thing above all was absolutely necessary—to find a proper camping-place : Cape Valentine was too risky should easterly gales come our way. Wild accordingly took the *Dudley Docker* westwards with a crew of four shortly after noon (on Sunday, the 16th). . . . When darkness came the *Docker* had not returned so a blubber fire was lit, which would be visible through the gap

between the stack and the cliffs. Shortly after 8.0 p.m. a hail was heard and we all turned out to welcome the returning crew and to haul the *Docker* into safety on the beach. Great was our joy to hear that Wild had found a decent camping-place about 6 miles to the west, apparently the only possible place they saw. . . . All hands were called to lash up and stow about 5.0 a.m. on Monday the 17th. It gave promise of being a fine day; a moon had been shining all night behind light clouds. All three boats were launched before 6.0.

They had hoped to get away with the high tide but they missed it, and a long wait followed. When they did sail a squall came down and it was evident that the weather was not to be as good as anticipated.

The *Caird* leading [Mr. Wordie says], we now rounded the skerries and rowed westwards. . . . We were now half-way, but just as we rounded this second cape our troubles began. Fierce gusts swept down off the land. . . . Then came a hard pull for dear life, hugging the land and making less than a foot at a time. . . . So we gradually pushed on, having lost sight of the other boats in the thick weather; weathered what we call the castle rock and finally reached our destination, more exhausted, I think, than by the previous boat journey. . . . Hot bovril and a hoosh of sledging ration and then to sleep.

Many were now suffering from exhaustion, and the blizzard that came down on them when they landed at Cape Wild, as the new camp was called, might well have meant the end of a party less ably led. On Tuesday, April 18th—

It was blowing a fierce blizzard and our battered tent was filled with snow. At midnight I was waked [wrote Wordie] by loud voices outside. . . . Both the pole-tents were flat on the ground. . . . At 6.0 a.m. the tide reached them and they all had to blunder out in the blizzard and seek safety higher up. The most alarming feature of the day was the departure of all life: penguins, seals, and sea elephants.

Safety had been found, though only as long as food lasted, and Shackleton saw that he could not transport his large and mixed body of men to civilization in the boats. He could and did, however, pick a crew of sailors who might possibly survive the long boat journey necessary to obtain relief for the others. He insisted on leading the forlorn hope himself and only six men could sail in the boat; Worsley, Crean, McCarty, Vincent and McNish were chosen. The whaleboat *James Caird* was prepared for the voyage and a kind of decking made out of wood from boxes and sledge-runners constructed. Relief might have been sought at the Falkland Islands, for Port Stanley was the nearest shipping-place, but the prevailing winds made these islands very



CAPE WILD, ELEPHANT ISLAND
(Note human figure in circle.)

By courtesy of J. M. Wordie

difficult to reach in a sailing-boat. South Georgia was chosen because it could be attained with much more certainty. The voyage of 800 miles would take at least a fortnight.

The first necessity for the twenty-two men left on the island under Frank Wild was adequate shelter and this was obtained by turning the other two boats upside down and mounting them on strong stone walls, 4 feet high. The boats were placed side by side so as to form one compartment and the tents were cut up for curtains, well lashed outside the walls and packed with snow. This improvised hut was 18 feet long, 9 feet wide and 5 feet high. Here Wild's party lived for $4\frac{1}{2}$ months. They needed a large amount of food and a constant problem was that of keeping up the stock until they were rescued. They had only a few weeks' provisions to start with. The penguins and seals that normally lived at Cape Wild had gone the night the party landed, making north before the approaching winter. Fortunately another migratory penguin, the Gentoo, came up on to the spit in considerable numbers before the end of April and turned the scale in favour of the party. Occasional seals also were killed.

Cape Wild was a most desolate place. A great rock, 95 feet high, stood out to sea and was connected with the main part of the island by some reefs and a shingle spit that formed a salient on the coast. Behind this from the sea were the cliffs of Mt. Houlder, 1,000 feet high and quite unclimbable. The spit was the only habitable area and did not exceed two acres in extent. All the rest of the coast consisted of great cliffs that could nowhere be climbed more than a short distance. Chores and butchering made up the greater part of life here, except for such observations as the scientists were able to make. Occasionally, at low water, limpets and edible seaweed were collected and eaten.

Commander Wild instituted a routine. After breakfast, almost invariably of penguin steaks, every man was roused out from the sleeping-bags, except in very bad weather, to take exercise. In the afternoon they would return to their bags, as there was nowhere else to keep warm. It was almost impossible to go any distance eastwards along the coast, but a way was sometimes found and seals secured in this direction. Wordie and Hurley prospected up the steep snow slopes to find a way inland, but the slopes always ended in rock cliffs or in ice cascades. Excerpts from Wordie's diary give occasional incidents in the monotonous life of the shipwrecked men: "*Sunday, June 25th*: Yesterday we killed

twenty-five penguins, to-day just over thirty; these numbers are an index of the water conditions—open sea.” The bays filled with ice during north-east winds and were cleared by south-west winds.

Tuesday, August 1st: Rain and wet mist for twenty-four hours, and it still goes on. . . . *August 20th*: On Friday close pack as far as we could see. . . . Yesterday and to-day the same. . . . *Tuesday, August 29th*: The ice is all gone bar streams of very small floes. It must be noted, however, that only six penguins were killed yesterday, and none to-day. And this is causing us a little anxiety, as our meat store is now considerably reduced.

Contrary to expectation, there was open water now, but there were very few penguins. The snow had begun to melt and it became difficult to keep the hut dry. No penguins came up on the 30th, and the outlook was not too rosy, when suddenly a ship loomed in the mist about 2 miles out and Shackleton brought relief.

We left the *James Caird* in preparation for her dangerous voyage. She was 22 feet 6 inches long, with a 6-foot beam, and her gunwale had been raised 10 inches. The mast of the *Stancombe Wills* had been used to strengthen the keel and prevent her from breaking her back in heavy seas. A ton of shingle was put in for ballast, to which the stores and equipment added another ton. Provisions for one month were taken.

At noon on Monday, April 24th, 1916, Shackleton and his five men left Elephant Island and at first took a north-east course towards the most open part of a line of pack ice that lay to the north. When this was passed, a northerly course was set in a strong westerly wind (force 6). As night approached and the seas were breaking over the boat, Shackleton joined Worsley at the tiller and sent the other men to their sleeping-bags below the decking in the bow of the boat.

We sat huddled up together [writes Worsley], Shackleton with an arm round my shoulder as I steered . . . talking as we had never talked before. . . . At midnight Shackleton boiled some water and added milk powder to it, and as we sipped the scalding drink we fell into a reminiscent mood. . . . As we talked Shackleton rolled cigarettes . . . and we smoked and continued to yarn all night. As dawn broke I became drowsy, and nodded as I steered . . . and he said in a disappointed tone: “You’d better go and get a sleep,” and roused one of the others to take my place. We had passed the quietest night that we were fated to spend.¹

¹ “Endurance,” 98-102, *passim*.

Very soon there was not a dry place in the boat, over which the seas poured almost unceasingly. In this sub-Antarctic zone the crew were not only soaked but cold, and Shackleton's great concern was to keep some warmth in their bodies. Worsley said—

It was a matter of principle with him to feed everybody to the greatest possible extent, so as to give them reserves with which to overcome the cold and wet. At night, each fourth hour, Shackleton would see to it that we got a drink of hot milk. . . .

On the second day, Tuesday, April 25th, the wind veered to the north, hindering their progress and setting up nasty cross seas with a high north-westerly swell. The motion of the boat was so violent that nearly all those hardened sailors were seasick. They all dreaded their quarters in the bows of the boat, for there was very little room and they had to lie on the rocks with which the boat was ballasted. Their sleeping-bags were soaked and they were drenched with the water that dripped on them while they slept. Moreover, the motion of the boat bumped them against the stones and the corners of boxes. At noon they were 64 miles north of Cape Wild. Two watches were set, one under Shackleton, the other under Worsley, so every man had four hours on and four hours off duty. Of the three on duty at any time, one steered and two baled the boat.

On Wednesday, the 26th, a gale sprang up from the north-west and they stood away to the north-east, the waves increasing in size. "Often our sail flapped idly in the calm between the crests of two waves," wrote Shackleton. "Then we would climb the next slope and catch the full fury of the gale where the wool-like whiteness of the breaking water surged around us." The biggest seas in the world are found in the Southern Ocean.

Every swell that rushed towards us hid the horizon astern and towered, an over-arching wall, above us. As the sea broke all round us the boat was lifted dizzily upwards, and we would heel over to the force of the gale. At these moments we could see for miles in all directions—but we saw nothing but grey, grey, grey—an unending series of grey hills and grey valleys. The dominant noises were the whistle of the wind through the sails and the shrouds, and the roar of the crashing seas.¹

The constant soaking with sea water caused a chafing of the skin into painful sores by their salt-laden clothes. The salt kept these wounds from becoming septic but increased the irritation.

¹ "Endurance," 110.

The coldness and damp also induced a partial loss of sensibility, resembling trench feet; Shackleton called it superficial frostbite. These discomforts prevented sleep for more than short periods, and for several days they thought they never lost consciousness. Shackleton suffered more than the others through a return of the sciatica he had had on the floe. A distance of 110 miles was sailed between noon on the 25th and noon on the 26th; and Worsley got his first observation of the sun since leaving Elephant Island.

The northerly gale continued all day on the 27th with violent squalls, the sky being overcast and misty. The sea was terrible, Shackleton writing:

The crests of the waves would often curl right over us and we shipped a great deal of water, which necessitated unceasing baling and pumping. Looking out abeam, we would see a hollow like a tunnel formed as the crest of a big wave toppled over on to the swelling body of water. A thousand times it appeared as though the *James Caird* must be engulfed; but the boat lived.

On Friday, April 28th, the conditions were similar to those of the previous day. There was a high north-westerly swell, but the wind had fallen to a fresh breeze. Worsley was able to take his second observation at noon on Saturday, the 29th, and found that a run of 85 miles had been made in the previous 24 hours. The wind freshened towards evening and a "high lumpy sea" got up. During the night a south-westerly gale arose and there was danger of the boat being swamped. Finally, she was hove-to and rode to a sea anchor, the storm being unabated.

Shackleton said, on the evening of May 1st¹: "No watch to-night, boys. There's nothing to watch—no bergs, no ships, and nothing to trouble us. So we'll all go to sleep while we are hove-to; nothing can happen to us. . . . I want you all to get a good sleep." By about 10 p.m. they were all asleep and had between four and five hours of much needed rest. Then, at 3 a.m., they all began to stir, moved by some common instinct or intuition that something was wrong with the boat. Without a word they all put on their boots, and as they did so it was obvious to them that the boat lacked her usual buoyancy, so they pumped her out. There was little water in her, but Shackleton crawled out and saw the cause of trouble—she was encased in ice.

"It's sinking her," cried Sir Ernest, and they set to work at once clearing the accumulation away. The weight of the ice was not only sinking the boat, but was also making her top-heavy, so

¹ Commander Worsley's Log is followed here.

that she was in danger of capsizing as well as of foundering. It was a perilous task to cut away the ice on the slippery and oscillating decking in the darkness. One man saved himself by catching the mast as he fell. Two of the sodden sleeping-bags, which weighed about 80 lb., and the spare oars, were thrown away to lighten the boat. By then it was dawn and the men were chilled to the bone, so they lighted the Primus stove and sat round it for a warm and a smoke.

About 11 a.m. on Tuesday, May 2nd, the last day of the gale, the boat suddenly fell off into the trough of the sea. The painter had parted and the sea-anchor had gone. This was serious [wrote Shackleton]. The *James Caird* went away to leeward, and we had no chance at all of recovering the anchor and our valuable rope which had been our only means of keeping the boat's head up to the seas without the risk of hoisting sail in a gale. Now we had to set the sail and trust to its holding.

The ice had chafed through the painter. That night, however, the wind died down and gradually the seas became lower.

Fortunately, on Wednesday, May 3rd, the sun shone and Worsley was able to take observations to fix their position. They had sailed 85 miles since the 2nd, and were 497 miles from Elephant Island and 347 miles from South Georgia. It is fitting that Commander Worsley's genius for navigation should be known. Mr. J. M. Wordie and Mr. R. W. James, who checked his sextant observations on the *Endurance* with the theodolite, wish to pay him this tribute; they say that the Skipper's speed in obtaining positions, and his accuracy, were almost uncanny. On the *James Caird* he had to perform a series of gymnastic feats in order to snap the sun from the lively boat, balancing himself on one toe with an arm round the mast. This sunshine was literally and psychologically the one bright spot of the boat journey. Shackleton set sail again for South Georgia before a good sailing breeze which held until 8 p.m. on May 5th. On the night of May 3rd, Worsley became cramped after his trick at the tiller and had to be massaged before his body could be straightened out. The vitality of all hands was now lower, but Shackleton fought this with hot food, in which he had a great belief.

On May 6th the *James Caird* nearly met her end. A hard north-westerly gale had backed into the south-west and set up—

a tremendous cross-sea—the worst, I thought [wrote Shackleton], that we had experienced. At midnight I was at the tiller and suddenly noticed a line of clear sky between the south and south-west. I called to the other men that the

sky was clearing, and then a moment later I realized that what I had seen was not a rift in the clouds but the white crest of an enormous wave. During twenty-six years' experience of the ocean in all its moods I had not encountered a wave so gigantic. It was a mighty upheaval of the ocean, a thing quite apart from the big white-capped seas that had been our enemies for many days. I shouted: "For God's sake, hold on! It's got us!" Then came a moment of suspense that seemed drawn out into hours. White surged the foam of the breaking sea around us. We felt our boat lifted and flung forward like a cork in breaking surf. We were in a seething chaos of tortured water; but somehow the boat lived through it, half-full of water, sagging to the dead weight and shuddering under the blow. We baled with the energy of men fighting for life . . . and after ten minutes of uncertainty we felt the boat renew her life beneath us. She floated again and ceased to lurch drunkenly as though dazed by the attack of the sea.

From 1 p.m. on May 6th till 1 a.m. of the 7th the *James Caird* had to lie hove-to, as the sea was too heavy to carry on. They broached their second water breaker and found its contents brackish; it had broken adrift when loading the boat and some sea water had percolated into it. This water was not actually undrinkable, but the effect of taking it was to accentuate instead of slaking their thirst and they had no other supply till land was reached. The voyage became a sort of nightmare, Shackleton wrote: "Our mouths were dry and our tongues were swollen . . . Our peril from the waves was buried beneath the consciousness of our raging thirst."

Fortunately the end of the voyage was near, though not as near as they expected. The sun peeped out and Worsley's sights showed that they were within 70 miles of South Georgia. The observation was made with difficulty in the jumpy sea and Worsley hardly expected more than an accuracy of 10 miles; later he knew that he was correct to within 2 miles. He was naturally anxious about making his landfall. Shackleton trusted him implicitly and the course was altered to east on May 7th, when they got under way again. This was done as a precautionary measure, for they would have been lost had they passed to the north of the island. May 8th, when they were due at South Georgia, was stormy and visibility low. At 10 a.m. some kelp was seen and shortly after two shags; these are birds which are said not to wander more than 15 miles from land. Then at 12.30 p.m. mountain peaks were sighted immediately ahead and about 9 miles distant. Worsley had not failed.

It was fourteen days, to an hour, since the *James Caird* had

left Elephant Island; and though black cliffs appeared and their goal seemed inaccessible, the chilled and wearied bodies of these men were stirred by the sight of land. Daylight was failing as they stood towards the shore and Worsley was anxious at once to make King Haakon Bay—

which lay ahead of us [he says], even at the risk of landing in the dark; for instinct told me that there was dirty weather ahead and that if we did not take this opportunity we might find ourselves in worse plight. Shackleton, however, considered that the risk of going on amid the reefs was too great, especially in view of the blind rollers that we had seen.

These rollers are more than dangerous, for a boat becomes quite uncontrollable in them and the *James Caird* would most probably have been wrecked.

Shackleton had to make one of his crucial decisions and, as always, he decided, in terrible circumstances, to make the lives of his men as safe as possible. Worsley agreed that it was "better to be safe than sorry," for uncharted reefs lined the coast—

and over them great waves broke, swirling viciously and spouting 30 and 40 feet into the air. . . . To have attempted a landing at that time would have been suicidal [Shackleton said]. There was nothing for it but to haul off till the following morning.¹

But now began the last and most terrible experience of the crew of the *James Caird*. They made what they thought was a safe offing, out of sight of land, and hove-to in a high swell. It was almost impossible for them to eat because they were tormented by thirst. Then at 5.0 a.m. on May 9th, one of the most violent hurricanes that any of them had known broke over the boat from the west, driving her towards the lee shore. Worsley says:

We found ourselves suddenly in the thick of a struggle against elements that seemed to have been loosed from the infernal regions. . . . When we had been in this hell's delight for ten hours, we saw, looming up through the spindrift, a towering black crag.

Shackleton must tell us of this crisis:

Our position had become desperate. We were on a dead lee shore, and we could gauge our approach to the unseen cliffs by the roar of the breakers against the sheer walls of rock. I ordered the double-reefed mainsail to be set ² in the

¹ "South," 177. May 8th was the day on which Mackintosh and Hayward, of the Ross Sea Party, disappeared.

² Worsley says this took an hour instead of the usual ten minutes.

hope that we might claw off, and this attempt increased the strain upon the boat. The *James Caird* was bumping heavily, and the water was pouring in everywhere. Our thirst was forgotten in the realization of our imminent danger, as we baled unceasingly. . . . The afternoon wore away as we edged down the coast, with the thunder of the breakers in our ears. . . . The chance of surviving the night, with the driving gale and the implacable sea forcing us on to the lee shore, seemed small. I think most of us had a feeling that the end was very near. Just after 6 p.m., in the dark, as the boat was in the yeasty backwash from the seas flung from this iron-bound coast, then, just when things looked their worst, they changed for the best. . . . The wind suddenly shifted, and we were free once more to make an offing.

All this time four out of the six men were baling for dear life, for only thus could they keep afloat. Worsley at one time thought it was inevitable that they would be wrecked, and felt it a pity to have thrown away such a splendid boat journey at the end. For a second night they stood off shore and ran again in the direction of King Haakon Bay, from which they had been driven southwards. The water was all of it spent and some of the men were now breaking down. Shackleton said to Worsley: "We must get water or ice. Two of the men are weakening." The Skipper suggested calling at Wilson's Harbour before making for the whaling stations on the opposite coast. But Sir Ernest said: "To tell you the truth, Skipper, I don't want to put to sea in her again. We are lucky to be alive, and I should be mad to risk losing everything by getting blown away to the east of South Georgia."

"Do you mean to cross the land to the whaling stations?"

"We'll try," he said briefly.

"The very idea of crossing the interior of this bleak glacier-covered island that had never been explored before was sufficient to revive my spirits. 'Good!' I said; 'that will reduce the men's time of waiting.' I knew that all his thoughts were on Elephant Island."¹

Day dawned on May 10th with little wind but a high cross sea running. King Haakon Bay was sighted and as they ran for it the wind increased. Reefs appeared on both sides of the boat and glaciers formed the coast ahead. There seemed, at first, no landing-place. A line of reefs had to be passed through a gap and then the boat rode in comparatively smooth water, but the wind suddenly blew straight off the land. The bay was about 8 miles wide and they had to beat across it five times before being able to reach a small cove that was the only break to be seen in the

¹ "Endurance," 131.



By courtesy of ROYAL GEOGRAPHICAL SOCIETY

THE *JAMES CAIRD* APPROACHING SOUTH GEORGIA

cliffs. Darkness was coming on when the *James Caird* touched the beach and the great boat journey was over.

A stream of fresh water was flowing at their feet and they drank great draughts before unloading the boat. All the stores and equipment had to be taken out of her before she could be hauled to safety; even then the men were too weak to pull her out of the water and a watch had to be set. A cave was found, and here they spent the next few days. A sea-elephant and young albatross, in defiance of the Ancient Mariner, provided fresh meat and a welcome change in their diet while they waited until the head of King Haakon Bay could be reached and the overland journey to the whaling stations started.

For six days the wind bottled up the *James Caird* in the cove by driving ice in, but this enforced rest enabled the party to gain some strength after their hardships; it also prepared three of them for their next effort. Worsley says in his diary that on Monday, May 14th, the sun scintillated on the shining waters as the boat was given "a glorious flying launch down the steep beach thro' the surf" and was sailed 8 miles to the head of King Haakon Bay. Here Peggotty Camp was established under the beached and up-turned *James Caird*, with plenty of sea-elephants for food. Two men were not in a fit state to be moved far, and were to be left here with a third man to look after them.

Shackleton and Worsley reconnoitred a few miles inland on the 16th. The weather was so bad that a start across the island was impossible until the 19th. There was then a full moon, and Shackleton decided to set out, with Worsley and Crean.¹ They carried three days' food between them but were otherwise unburdened. The distance to Stromness, the nearest whaling station, in a straight line, was less than 20 miles; but it might be more than double this distance by any possible route—if a route could be found. Worsley says: "At 2 a.m. on Friday, May 19th, 1916, the moon was shining brilliantly, and the weather was fine and clear. Shackleton said: 'We will start now, Skipper.' By three o'clock we had embarked on our pioneer journey across the island," the interior of which was at that time quite unknown.

The little party first plodded for two hours up a mountain

¹ This was the third time when Crean took part in a journey of rescue. The two previous occasions were his carrying news of the disaster to Scott's ponies on March 2nd, 1911, and his solitary march to Hut Point for the rescue of Lieutenant Evans on February 19th to 20th, 1912.

flank, through snow that was ankle deep and down which boulders occasionally rolled. Five rocky peaks could be seen ahead of them in the moonlight, and through one of the four cols between them Shackleton hoped to pass. By 5 a.m. his party had ascended 2,500 feet into a mist and found themselves on the edge of "a strange, dark pit," says Worsley, "that was more than a hundred feet deep." They roped up and Shackleton broke the trail. In another hour they reached the saddle to the north of the five peaks, and as the fog cleared a little they saw a frozen lake below them on the far side. They paused to eat a biscuit while deciding whether to keep on the ridge or descend to the lake. The latter course, unfortunately, was chosen and followed for an hour, when the light being better with advancing dawn, and the fog clearing away entirely, the "lake" was seen to be an arm of the sea, Possession Bay, far to the west of Stromness. No way could be seen along the coast, where the transverse ridges and glaciers of the island descended to the ocean, and at 7 a.m. they were obliged to retreat back to the watershed. This took two hours, and they regained the saddle nearer to the five peaks than where they had left it. After being on the march for six hours they took their first hot meal.

On resuming the march they aimed for the right-hand or most southerly gap of the five peaks and reached it soon after 11 a.m. to find a precipice, over 1,000 feet deep, on the other side. They could not see whether the next col to the north would be negotiable, but their only course was to try it, so they retraced their steps for a certain distance in order to work round the next peak. All this unaccustomed walking and climbing was beginning to tell on them. While ascending to the second col, at a height of several thousand feet above the sea, they made a short spell every twenty minutes, when they flung themselves on their backs to recover their breath. Commander Worsley has well described what followed:

When we attained the crest of the second pass and again looked down, we found the conditions almost as bad as at the first. The beauty of the scene only intensified the irony of our position. . . . We stood between two gigantic black crags that seemed to have forced their way upwards through their icy covering—dark and forbidding masses of bleak and barren rocks.

A way had to be found and once more they retreated until able to work round the next peak to the north. The third col was

about 5,000 feet high and nearly as precipitous as the others.¹ It was now 4 p.m. and the sun was setting, so the position of the party was becoming serious. From here, fortunately, a descent from the fourth and last col, as well as could be seen, appeared possible. As Worsley said, they would be obliged to descend here for there was no other way.

They had descended to the lowest point in making the detour round the next peak to the north before beginning the climb to this col, and darkness was now falling, when they stopped abruptly on the brink of a gigantic chasm; Shackleton called it a *bergh-schrund*. It was a mile and a half long, 200 feet deep, and 200 feet wide. They were glad to leave it behind and concentrate on step-cutting up the icy slope that then confronted them. So engrossed were they in their work that they failed to notice a heavy sea fog rolling up behind them until they reached the ice ridge and found themselves in a worse dilemma, for sailors, than that of being between the devil and the deep blue sea.

Shackleton wrote :

After a glance over the top I turned to the anxious faces of the two men behind me, and said : " Come on, boys." Within a minute they stood beside me on the ice-ridge. The surface fell away at a sharp incline in front of us, but it merged into a snow-slope. We could not see the bottom clearly owing to mist and bad light, and the possibility of the slope ending in a sheer fall occurred to us ; but the fog that was creeping up behind allowed no time for hesitation. We descended slowly at first, cutting steps in the hard snow ; then the surface became softer, indicating that the gradient was less severe. There could be no turning back now, so we unroped and slid in the fashion of youthful days. When we stopped on a snow-bank at the foot of the slope we found that we had descended at least 900 feet in 2 or 3 minutes. We looked back and saw the grey fingers of the fog appearing on the ridge, as though reaching after the intruders into untrodden wilds. But we had escaped.

Their course then lay over an extensive snow-plain or *névé* field in which were crevasses. At 6 p.m. they had another meal. They set off in the darkness on a rising gradient, and were cheered, at 8 p.m. by the full moon as it topped the eastern peaks. At midnight they reached a height of about 4,000 feet and then they made a mistake in their route by bearing to the east down an alluring slope, thinking that Stromness Bay lay at its foot. At 1 a.m. on May 20th, after travelling for twenty-two hours, they partook of

¹ Shackleton omitted reference to this third col, and his account of this part of the journey differs a little from Worsley's, though there are no important differences between the two accounts. The latter is here followed.

their third hot meal, feeling much strengthened and refreshed by the rest and food.

They then believed that they were on the Fortuna Glacier and felt very tired when it was found necessary to turn back and ascend it for some miles. By 5 a.m. they had reached the rocky spur of another transverse range that separated them from their goal, and they sat down for a rest. Worsley and Crean fell asleep immediately, but Shackleton thought it dangerous for all of them to lose consciousness at the same time and woke his companions in five minutes, for dawn had come. A gap through the transverse mountains was soon found and at last, from the pass, they saw the end of their journey. They reckoned that there were still 12 miles of difficult country to traverse before arriving at the whaling station, but their spirits were uplifted and they now felt confident of ultimate success.

Their height at this time appeared to be about 2,500 feet, and a gentle slope led downwards. At about 6 a.m. they had breakfast and soon afterwards heard the steam whistle from the whaling station. The mountain-side, however, became steeper, and Shackleton asked his companions if they were willing to continue on their course as he feared it ended in a precipice. They gladly took the risk, for it would save a detour of several miles, so they descended over about 500 feet of soft snow. This was followed by "a steep gradient of blue ice," down which Shackleton was lowered on the rope, cutting steps. There proved to be a precipice at the foot of it, but it was avoided by taking a diagonal course.

At 10 a.m. they were on the beach of Fortuna Bay and had only one lower range to cross before reaching their objective. The crest of this ridge, at a height of 2,500 feet, was attained at 1.30 p.m. and from here the station could be seen, with minute figures running to and fro. The only way down seemed to be by the bed of a stream in which a considerable volume of water was flowing, and they became very wet before their progress was arrested at the top of a waterfall, 35 to 40 feet high. Shackleton and Worsley lowered Crean, who was the heaviest man of the party, over the edge.

He disappeared altogether in the falling water and came out gasping at the bottom. I went next [wrote Shackleton], sliding down the rope, and Worsley, who was the lightest and most nimble member of the party, came last. . . . We had flung down the adze from the top of the fall and also the log-book and

the cooker wrapped in one of our blouses. That was all, except our wet clothes, that we brought out of the Antarctic, which we had entered a year and a half before with well-found ship, full equipment, and high hopes. That was all of tangible things ; but in memories we were rich. We had pierced the veneer of outward things. We had "suffered, starved, and triumphed, grovelled down yet grasped at glory, grown bigger in the bigness of the whole." We had "seen God in his splendours, heard the text that Nature renders." We had reached the naked soul of man.¹

The whaling station was reached at 3 p.m. on May 20th, 1916, thirty-six hours after leaving Peggotty Camp. It had been a wonderful journey in more ways than one, for Shackleton believed that someone else had been with him in addition to Worsley and Crean, and he said : "I have no doubt that Providence guided us." Worsley still regards this as a mystery ; he also felt that there were four in the party. They both said that Crean thought the same.² Commander Worsley said to the writer :

I want you to understand exactly what I felt about this. When we had reached Stromness I repeatedly went over our experiences and always found myself thinking or saying : "Let me see, there was Shackleton and Crean and myself and—Who was the other?"

Shackleton's biographer, in a very fine passage, says :

If his return to the *Nimrod* on the Plateau, the Glacier and the Barrier, seven years before, had been a race with death on his pale horse, Shackleton's return from the *Endurance* over the Floe, the Ocean and the Mountains, had been one long wrestling bout with the same grim adversary, dismounted, and in earnest. Never for an hour in all those months had Shackleton or his men been free from the menace which only unsleeping vigilance could save from becoming a stranglehold. In this struggle Shackleton had risen to the height of moral greatness, though the ambition he had started with was wrecked and his party scattered.³

Worsley went off in a whaler on the night of their arrival at Stromness to fetch the three men from Peggotty Camp. They were all well and reached Stromness on May 22nd. Preparations were immediately set on foot to rescue the men on Elephant Island. It was now a month since Shackleton had left Wild's Party with only a few weeks' provisions. A whaler, the *Southern Sky*, was chartered, and Shackleton, Worsley and Crean sailed from South Georgia on the 23rd. When 60 miles from Elephant Island the

¹ "South," 205, Shackleton quoting Robert Service.

² "Endurance," 165.

³ "The Life of Sir Ernest Shackleton," 227-8.

way was blocked by pack ice and the ship had to fall back on Port Stanley in the Falkland Islands.

Shackleton had no means of knowing that his marooned men had sufficient food, and rightly assumed that immediate rescue was demanded. He therefore made a second attempt in a steam trawler, the *Instituto de Pesca*, lent by the Uruguayan Government. This time he got to within 20 miles of the island. The British colony in Punta Arenas then fitted out the little schooner *Emma*, but that also failed. Finally, a fourth and successful attempt was made in the Chilean Government steamer *Yelcho*. The party of twenty-two men were found all well after $4\frac{1}{2}$ months' separation. It is characteristic that the first words of the marooned men were not of joy at their rescue but "Thank God the Boss is safe!"

CHAPTER XII

BACK TO THE BEARDMORE: SHACKLETON'S ROSS SEA PARTY

THE British or Beardmore Route to the South Pole was destined to witness at least one more example of the highest endeavour after the death of Captain Scott. The misfortunes of the party whose duty was to lay the Beardmore Depots from McMurdo Sound were in this respect greater than those of the Weddell Sea Party, that they involved the loss of life. It was remarkable that the *Aurora* should also be beset; and the drifting of both the ships of one expedition in the ice pack for months is unique in the annals of polar exploration.

The *Aurora* was taken over from Sir Douglas Mawson at Hobart and sailed to Sydney for a complete overhaul. Here, on November 6th, 1914, the Ross Sea Party assembled, with Captain A. Mackintosh in command of the ship and Lieutenant J. R. Stenhouse as Chief Officer. There was a small staff of scientists and technicians including Messrs. J. L. Cope, the Rev. A. P. Spencer-Smith who was the first Padre to visit Antarctica, Ernest Joyce, in charge of the transport, A. Stevens and others. Twenty-eight men sailed for McMurdo Sound, of whom ten formed the Shore Party. Sydney was left on December 15th, 1914, and Hobart reached on the 21st. On the 22nd Sir William Macartney, Governor of Tasmania, and Lady Macartney, Captain Scott's sister, came aboard the *Aurora* and presented the expedition with a portrait of Captain Scott. After 80 tons of stores and 26 dogs had been embarked the Antarctic voyage began, on Christmas Day, and Macquarie Island was reached on December 30th. Sir Douglas Mawson's station on this island was then being worked by an Australian Government staff.

Mount Sabine in South Victoria Land was sighted on January 7th, 1915, and two days later Cape Crozier was reached where an unsuccessful attempt was made to disembark a small hut. The locality had altered considerably since Dr. Wilson's winter journey and the penguin rookery was not seen. While the boat party was vainly seeking a landing-place, the *Aurora* broke her jib-boom against the Barrier; but this was less serious than the delay caused

by the pack ice which prevented the ship from reaching any winter quarters until January 16th. Captain Mackintosh had no choice of location, as Cape Evans, Captain Scott's *Terra Nova* Station, was the only one that the ice permitted the ship to touch. Ten tons of coal and a hundred cases of oil were deposited on the sea ice here and then the *Aurora* proceeded towards Hut Point to forward the autumn depot laying.

A depot had to be laid in latitude 80° S. before the winter and to this end Joyce took an advance-party from the ship on January 24th with a load of 1,200 lbs. and reached Hut Point about 8 miles away, that night.¹ The next day Mackintosh followed with a second party, and on the 30th Cope brought up the rear with a third. The first two parties took dog teams, but the conditions on this journey were severe and as the dogs were not properly broken in most of them died. Cope's Party had a motor tractor which was soon out of action and he turned back for Hut Point before the end of February. The course taken to the south followed that of Shackleton in 1908 and was near Scott's trail of 1911.

Mackintosh wrote in his diary on January 28th that he felt despondent, because they were not getting on as well as he expected. The worst obstacle to progress, at that time, was the soft snow that was sometimes up to the men's knees. On the 31st Mackintosh found Scott's Safety Camp with 3 feet of snow over one of his abandoned motor sledges. Relaying had to be adopted, and only 2 or 3 miles a day were accomplished until February 2nd when the surface improved and from 6 to 11 miles became the daily distance.

Joyce worked his team independently of Mackintosh and reached the position for the Bluff Depot two days ahead of him, on February 9th. The depot was laid here, 70 miles from Hut Point, and Mackintosh decided to take on the nine best dogs to latitude 80° S., about 70 miles farther. Joyce wished to save them for the long Beardmore journey of the following season, in which he was probably correct; but he was overruled, and continued to the south with Mackintosh and Ernest Wild, Frank Wild's brother. The Rev. A. P. Spencer-Smith, usually known as the Padre, turned back from the Bluff Depot with two other men and the five weakest dogs.

Blizzards and soft snow retarded the progress of Mackintosh's party and latitude 80° S. was not reached until February 20th. No

¹ See Chart No. 4.

trace was seen of Scott's One Ton Depot, though they must have passed near it. The new depot in latitude 80° S. was well marked and was 140 miles from where they had left the ship. As this journey had occupied twenty-seven days, the average speed had been little more than 5 miles a day. There were blizzards nearly every day after reaching the destination. The short Antarctic summer was over and the weather breaking up; hence the return to Hut Point was a struggle in which death repeatedly hovered near the little party. A blizzard prevented them from making more than 4 miles on the first day of the return journey, February 26th, and travelling was impossible during the next two days, so they went on half rations. The whole journey was a struggle against great odds; the sleeping-bags were in a dreadful state and the men were becoming frostbitten.

The Bluff Depot was reached on March 10th and found to be 4 miles out of position; it was therefore moved, at the cost of great labour to the weary men. On the 12th they resumed their northward march with the week's provisions and 50 miles to go before reaching Safety Camp where the next supply was to be found. The temperatures steadily descended to the *minus*-forties and the men could not keep warm on the march, which they knew was a danger signal; but none of them broke down. Their progress was ominously slow and again they had to go on half rations; this further reduced their vitality and power of resisting cold. They struggled to Safety Camp, with very little margin of strength, on March 24th. They were then in a land of plenty and appear to have eaten inordinately without any ill effects. Hut Point was reached on March 25th after twelve awful days from the Bluff, Joyce contrasting with it his dash over the same 50 miles with 8 dogs in 1 day, when on the *Nimrod* Expedition. Mackintosh's party had travelled about 280 miles in 60 days, on 14 of which there had been blizzards accompanied by low temperatures. The *Aurora* had taken five men to Cape Evans, leaving three at Hut Point when the Depot Party returned. While the six men awaited the freezing of the sea the centre of interest passed to Cape Evans, where Mackintosh's Party returned when the road was safe. The ship had sailed here from Hut Point on March 11th with Spencer-Smith's Party, leaving Cope and two others awaiting the return of the Depot Party.

From March 11th to the 23rd, when four men were landed, "only small, indispensable supplies of stores and no clothes were
C.S.P.

issued to the party on shore." Shackleton remarked that "the landing of stores, gear and coal did not proceed at all rapidly, it being assumed that the ship would remain at her moorings throughout the winter." The ship was secured about 40 yards off shore with six steel hawsers and one cable astern and two anchors forward, with the bows pointing seaward. The stores for the depots on which the Trans-Antarctic Party would depend, and both stores and equipment for the *Aurora* Shore Party, had not been landed by the beginning of May, 1915. The ship was seen by the Shore Party at 11 p.m. on May 6th when the wind blew from the south-east at 40 m.p.h. At 3 a.m. on the 7th the wind had not increased to any extent, but the ice and ship had gone, leaving ten men on Ross Island without means of subsistence and the Trans-continental Party, as far as the *Aurora* was concerned, to perish on the Beardmore Glacier or the Barrier.

The Shore Party reacted bravely and well to this disaster, compiling a list of their meagre assets, which they estimated would last the ten men for a hundred weeks. Much of the coal that had been dumped on the ice went out with the ship, but all that remained was salvaged. Shackleton repeats that "no general provisions and no clothing of the kind required for sledging had been landed from the ship. Much of the sledging gear was also aboard."

Such a predicament is almost unparalleled in polar history and the greatest credit is due to the Shore Party for the way in which they coped with the serious position that confronted them. They fully realized that the Beardmore Depot must be laid at all costs, knowing that their own lives might be the price—as the lives of some were. Their resources consisted in the stores and old equipment left by the *Terra Nova* Expedition at Cape Evans, the *Nimrod* Expedition at Cape Royds, and to some extent the stores at Hut Point. In other words, here was an expedition forced to rely in great measure on what was left over from previous expeditions. They were not so badly off for food, because seals could be caught in the spring, but their tents and sledge clothing had already been much used and were almost worn out. This alone was enough to endanger life on the trail.

The six men at Hut Point lived a primitive existence until the end of May. There were at first only three sleeping-bags, and the throbbing pain of frost blisters prevented sleep. Seals formed their staple food until June 2nd when they were able to make the crossing to Cape Evans and the whole party was then reunited for



By courtesy of H. G. PONTING]

WEDDELL'S SEALS SLEEPING
On the sea ice by Razor-back Island



By courtesy of H. G. PONTING]

A CREVASSE AT CAPE EVANS

the winter. The most difficult problem was to improvise clothing fit to stand the rough usage of the following sledging season. With scarcely less concern the party found that their only sledging equipment would consist of old and worn sleeping-bags and socks, parts of pony rugs and of cookers, old Primus lamps, three old tents, some old leather and a quantity of canvas. This canvas provided a new pair of trousers for each man, and thirty pairs of fur boots were made out of spare sleeping-bags and oddments. The three tents were patched, but the old Primus lamps were most precarious, having no spare parts. Human life cannot be maintained on a sledge journey without heat to melt snow, as there is no other means of obtaining a drink.

The *Nimrod* hut at Cape Royds could not be reached until August, and enough food was found here to last six men for a year, but very little clothing and no equipment. The most interesting discovery was one tin of tobacco, of which the party otherwise had none, and a box of cigars; soap also was an unwonted luxury. Spring sledging began on September 1st and during the month about 4,000 lb. of stores were transported to Safety Camp on the Barrier. The men wore their home-made canvas trousers, and boots improvised out of old horse rugs. The journey about to be made to the Beardmore Glacier would never have been attempted if the Ross Sea and the Weddell Sea Parties had been in wireless communication, and thus three lives might have been saved.

Nearly all supplies had been sledged to Safety Camp by October 9th, when the first spring depot journey to Minna Bluff began. Mackintosh was working his stores forward, and the next task was to establish an advanced base. Nine men set out to attempt this, leaving one man alone at Cape Evans to keep up the meteorological record. Blizzards had been blowing for about ten days when they started from Hut Point and soft snow made progress almost impossible. Half a mile was accomplished on October 9th and 4 miles the following day. On the 11th the tale was only $3\frac{3}{4}$ miles and on the 12th Mackintosh retained Wild and the Padre, allowing Joyce the other five men. The latter party, by cutting down their permanent weights, made better progress. Joyce had work to do of which he was quite capable; he was also a most resolute man, devoted to Shackleton. His party reached the Bluff on October 21st, after a hard journey, and left 373 lbs. of stores there. They found that Mackintosh had been there on the 19th and had *cached* 178 lbs. Hut Point was regained on the 27th, after an

average rate of 17 miles a day had been maintained during the return.

A note written by Cherry-Garrard to Captain Scott was found at an old *Terra Nova* camp ; it was written on the day, March 19th, 1912, when Scott made his last day's journey to the camp of death. A discovery of more practical value to the needy men was that of eight cases of dog biscuits. On meeting Mackintosh at Hut Point Joyce told him that he had decided to use the five remaining dogs on the next journey. Mackintosh set off again for the Bluff on October 29th, Joyce having to stay behind to repair equipment ; meanwhile, he sent three men to Cape Evans for more dog food. He had completed all possible renovations when they returned on November 2nd, but a blizzard prevented them from starting until the 5th and some more patching of clothing was done during the delay.

Joyce set out on his second spring journey to the Bluff with the five dogs, five men, and provisions for seven weeks. The daily distance gradually increased to 12 miles. On November 15th 624 lbs. of stores were *cached* at the Bluff, the five dogs enabling them to double the previous amount left there. Mackintosh, Wild and Spencer-Smith had deposited 188 lbs. on the 13th. A blizzard made travel impossible on November 16th and 17th. It was then decided that, after the next trip, Mackintosh's Party should work from latitude 80° to 81° S. Joyce's Party would fill up the 80° Depot and lay the 82° Depot, sending three of the weakest men back.

Hut Point was reached on November 20th after marching 53 miles in the last 3 days, though Joyce suffered from snowblindness. His party set out on the 25th for their third journey to the Bluff. Three days later, on meeting Mackintosh's Party, Spencer-Smith was not looking well. Joyce had 1,400 lbs. on his sledges and after a good journey *cached* 729 lbs. at the Bluff Depot on December 3rd. On the 7th he was back at Hut Point for the last time before crossing the Barrier, having marched the 70 miles in 4 days. He then showed his grasp of the situation by advising his companions to eat as much seal meat as possible.

The long Barrier Journey, which took the fourth trip to the Bluff in its stride, began on December 13th, 1915, after Joyce had fried 200 lbs. of seal meat. All were thankful that this was their last journey to the Bluff as they had dragged about 5,000 lbs. of stores to this depot already. Their rate at first was from 10½ to 12 miles a day and then, on December 16th, the blizzards started and raged, with short intervals, for nine days. This was a bad

beginning for an 800-mile journey. On the 22nd Joyce celebrated his birthday, the eighth spent in Antarctica; the surface became abominable and progress slow, but the Bluff was reached on December 28th.

The second stage of the journey, from Minna Bluff to the Beardmore Glacier, was entered upon by Joyce's Party on December 29th. Mackintosh was ahead, and his tracks were followed until New Year's Eve when the two parties met and discussed the situation; they decided to meet again in latitude 82° S. On January 3rd, 1916, one of Joyce's Primus stoves went wrong, which made it necessary for one of his three-men units to return. He had intended to take the six men as far as latitude 81° S. and divide his party there; but on January 6th Cope turned back with the two weakest men, while Joyce, Richards, Hayward and the dogs went forward with the heavy load of 1,285 lbs. They built snow cairns for Shackleton's guidance. Mackintosh came up with them on the 8th and suggested joining the two parties; Joyce said this would delay them but he took 50 lbs. of his load. Later in the day Joyce found that Mackintosh was becoming exhausted and the latter asked Joyce to take charge of both parties. On the 9th Mackintosh had a sprained knee and Joyce said they could not afford to have an invalid with them. Mackintosh felt, however, that he was responsible for seeing the Beardmore Depot laid.

On January 11th he and Spencer-Smith were not well, but the following day latitude 81° S. was reached and a large depot built there. Two and a half miles were accomplished through a blizzard on the 13th, and on the 14th land, probably Mt. Longstaff, was sighted. From 10 to 12 miles were marched every day after this, and though Mackintosh and Spencer-Smith were not well on the 17th, latitude 82° S. was reached next day and another large depot laid down. On the 19th the Padre complained of his knees giving way and was in great pain. The party, with lighter loads, were leaving about 13 miles behind them each day; but on the 22nd Spencer-Smith could go no farther. Joyce wished Mackintosh to remain with the invalid while the others pushed on to Mt. Hope. The Padre said, however, that he would be all right alone and Mackintosh insisted on proceeding, though five men had then to squeeze into a three-man tent.

On January 24th a blizzard prevented marching and Joyce put the party on half rations; he also massaged Mackintosh's knee. A new record distance for this party of $17\frac{1}{2}$ miles was made in the

day, which brought them to land; and on the 26th they reached the Gap where one of Scott's old depots was found. The new depot for Shackleton was carried to the summit of Mt. Hope and marked conspicuously for a party descending the glacier. A distance of 22 miles was made on this day—the one hundred and forty-eighth since sledging began. The successful accomplishment of this task, upon which the lives of the Trans-continental Party would depend, was a matter for congratulation and ended the second stage of the journey. The next stage, the return across the Barrier, presented a different problem, that of saving life. One invalid, it was certain, would have to be transported a distance of 370 miles; and on January 28th, at the first return camp, indications of scurvy were found on some of the others. The following day when Spencer-Smith's tent was reached, he was found incapable of walking; his companions therefore placed him on the sledge, and the dogs, which were still in good condition, pulled with a will.

Mackintosh was little more fit to walk than the Padre; his ankles were badly swollen, but with abounding pluck he refused to give way. Hayward also now had scurvy. On February 4th Spencer-Smith fainted from weakness. Excellent progress was being made at this time and the daily distance extended to as much as 18 miles. The 81° Depot was picked up on the 7th. Two days later the Padre became worse, though his comrades were doing all they could for him and the high average speed of 17 miles a day was kept up till the 80° Depot was reached on the 11th. Hayward was then too ill for much pulling and Mackintosh usually hobbled alongside the sledge.

On February 12th and 13th only 12 m.p.d. could be marched, for the labour began to weaken the three stronger men and Hayward was failing. During the next three days the speed fell to 8 m.p.d., though they pushed on through a snowstorm on the 16th. As they approached the grave of Captain Scott, blizzards became more continuous and day after day no march was possible. Even on half rations their food was nearly finished. On February 20th the position was serious, for the oil was exhausted and the invalids were worse. Next day, the fifth of the blizzard, there was one biscuit each with three-quarters of a pint of tea and a quarter of a pint of pemmican. This party, as Scott's had been, was about 11 miles from their depot and unable to move on account of the blizzards. They were only a few miles from Scott's grave.

On the 22nd the dogs were given the last of their food and it was decided that the party must march, whatever the weather, on the following day. There was then no change for the better and they did not start till 2.30 p.m. when Spencer-Smith again fainted as he was being lifted on the sledge. Mackintosh also fell down from exhaustion, so it was evident that neither of them was fit to travel. Wild therefore remained to care for them while Joyce, Richards and Hayward attempted to reach the depot 10½ miles away. The blizzard was so violent that, even with the dogs and an empty sledge, it took an hour to cover half a mile. At 9 p.m. they camped and took one cup of tea and half a biscuit each. This amount was repeated for breakfast on February 24th when the blizzard still raged.

On going outside the tent to make a start the wind was found to be blowing from 70 to 80 miles an hour, through which it was impossible to march; yet this was the third day the dogs had been without food and Joyce saw no hope of rescuing the invalids without the dogs. On the 25th the wind was less violent and though it was still snowing they set out, for they were not only near to Scott's grave but also to his fate. There was nothing to eat, and lunch consisted in half a cup of thin tea. The tent was torn and the temperature down below 20° F. They struggled on a little longer till the wind rose again to 60 miles an hour and they were obliged to camp. They patched the tent with empty food bags. Their position was now critical as Hayward was breaking down.

After nine days the blizzard ended and on February 26th the Bluff Depot was sighted. Hayward collapsed and was put on the sledge; Joyce and Richards were exhausted when they reached the depot. One day more without finding it would have resulted in the loss of six lives. The blizzard only ceased long enough for the men to reach the depot and then came down again as pitilessly as ever, the wind attaining a velocity of 90 m.p.h. Mackintosh's Party, on February 27th, had been without food for five days; but for eleven consecutive days there had not been one complete day fit for travelling. The same conditions had prevented Scott, Wilson and Bowers, a week later in 1912, from reaching their One Ton Depot in the immediate vicinity.

An attempt was made to regain Mackintosh's tent through the blizzard, but the men became exhausted and had to camp after struggling with the elements for nine hours. On February 28th

they marched for two hours, when a 70-mile blizzard stopped them again. Their feet were becoming frostbitten and they had to mend their fur boots with old food bags. Soon after noon next day Mackintosh's tent was reached; he was found to be staggering, but he thanked Joyce profusely for his journey. Spencer-Smith was very weak and had not moved for six days. Both had to be carried on the sledges, drawn by four men, all of whom had scurvy, one of them severely, and by the four dogs, still in good condition. They travelled 3 miles that day and Joyce thought they had a bare chance of reaching Hut Point, 80 miles away, though their sleeping-bags were wet through, as well as worn out, and their clothes in tatters.

Hayward was now unable to pull and was tied to the front sledge, the other two invalids being lashed on the top of the loads. On March 1st Scott's grave was seen and passed a short distance away to the east. Mackintosh fell off his sledge, unnoticed for some time, and the dogs at first refused to travel southwards to fetch him. The Bluff Depot was reached that night, and next day 12 miles were accomplished; but on March 3rd the blizzard was too violent for travelling, though it was agony to remain in the sodden sleeping-bags. On the 4th Hayward was so much worse that a march had to be attempted, for the only hope of curing his scurvy was the fresh seal meat at Hut Point. Travelling, however, necessitated carrying him also most of the time, though he struggled along on foot as far as he could. Mackintosh was depressed in spirit and again fell off the sledge. Spencer-Smith was always cheerful, in spite of the fact that everything had now to be done for him.

A crisis was reached on March 7th, when only $3\frac{1}{2}$ miles were accomplished and some reorganization became essential. Hut Point was then between 30 and 40 miles away and Joyce was afraid that either Wild, Richards or himself would break down, for they all had scurvy, and if so the whole party would perish. Mackintosh then volunteered to remain behind until rescued and was left alone in a tent with three weeks' food. The others went on with Spencer-Smith and Hayward on the sledge. The Padre groaned with pain during the night of March 8th and told Richards that his heart was behaving strangely. He had been ill for fifty-seven days, on forty of which he had been carried on a sledge, and that night he died. Hayward collapsed with the shock and was taken out of the tent for the burial. As soon as he had recovered they got

under way. The temperature was down to -32° F. and there was a north wind that pierced their tattered clothing.

Ten miles were made before camping, and on March 10th the Barrier Edge was reached. The party arrived at Cape Armitage after nearly seventeen hours' marching, but open water prevented them from gaining the hut that day. They reached it at 3 p.m. on the 11th and received a most inhospitable welcome. There was no news of the ship, so Joyce supposed she had gone down with all hands. Richards and Wild killed two seals and life began to be worth living when a good meal of dried vegetables was eaten, followed in a few hours by porridge, seals' liver and coffee. The dogs soon recovered and in a few days the men also felt stronger.

On March 14th, as Hayward seemed fit to be left, the others set out to relieve Mackintosh. Their tents were nearly all patches and their clothes had often been repaired with old food bags. The temperature that night was down to -35° F., which was very chilly in the dilapidated sleeping-bags; but on the 15th they covered 20 miles and the following day reached Mackintosh, who was very ill. They placed him on the sledge and the dogs trotted some miles towards Hut Point before camping. Again the temperature went down to -35° F. and Hut Point was reached next day. Mackintosh heartily thanked Joyce's Party for saving his life and Shackleton afterwards wrote a letter of thanks to Joyce in which he said: "Your conduct on that long, trying, southern journey—especially after Mackintosh broke down—ranks in my mind . . . with the best deeds of polar exploration."

Joyce's Party had been in the field for over 200 days and had marched 1,641 miles in about $6\frac{1}{2}$ months' sledging. Joyce received the Albert Medal from the King after his return. Now began a period of waiting at Hut Point for the sea to freeze, just as Scott and his larger party had waited there in 1911. There was only a makeshift blubber stove and the old hut was falling to pieces. The invalids had recovered by the beginning of May, while blizzards raged for weeks at a time. On May 7th Mackintosh found the sea ice to the north would bear his weight and, like Scott, was anxious to reach Cape Evans. Scott's Party had a very fortunate escape in 1911. On May 9th, 1916, Mackintosh asked Joyce's advice about making the crossing. Joyce was very much against it, but Mackintosh and Hayward started after breakfast. Half an hour later a southerly gale began and increased to a howling blizzard.

The tracks of the two men could not be followed till May 12th, when they were found to end in open water. The other men remained at Hut Point till July 15th, when the ice was safe and the crossing made to Cape Evans without special hazard. They asked at once if Mackintosh and Hayward had arrived and found they had not. Diligent searches were afterwards made for the lost men but no trace of them was ever discovered. Mackintosh and Hayward had no equipment and probably perished in the blizzard they defied as they drifted out to sea on an ice floe.

There were then seven men at the station, with sufficient means of subsistence to last them until relieved. Most of their provisions were at Cape Royds and three of them made the *Nimrod* hut their home during October and November, 1916. Joyce, as taxidermist, made the following biological collection there: 50 Emperor penguins, 70 Adelies, 15 seals, 3 sea leopards, 10 skuas, 4 Snow and 2 Giant petrels, with a number of young birds. A final journey was afterwards made on the Barrier for the double purpose of erecting a cross over Spencer-Smith's grave and of bringing in some geological specimens that had been left 48 miles beyond Hut Point. Cape Evans was regained for the last time on January 3rd, 1917, and a week later, on the 10th, when the party was beginning to prepare for another year in McMurdo Sound, Shackleton arrived in the *Aurora*.

We now turn back to the night of May 6th to 7th, when the ship and her company of eighteen men drifted off without having discharged her cargo. Lieutenant Stenhouse, who was in command during Mackintosh's absence, at once ordered steam and had the wireless apparatus put in order. The engines, however, were useless, for the ship was embedded in the pack ice, and the wireless never functioned. On May 14th the *Aurora* was 45 miles north and 37 miles west of Cape Evans. She remained in the neighbourhood of Granite Harbour till the 22nd, when a blizzard drove ship and pack to a point about 20 miles east of the Nordenskjöld Ice Tongue. In the early days of June she passed to the north of a straight line drawn from the tongue to Franklin Island, and so she drifted northward.

In the month of July the ice began to press on the ship. On the 18th her position was 78 miles north-east by north from Franklin Island and she endured some severe squeezes. The pack became more active until the 21st, when the ship was badly nipped

by the ice and the rudder smashed. She was in such a bad position that preparations were made for abandoning her on the following day. Towards the end of the 22nd, however, the pressure became less and the ship was safe for the time, though the ice continued to work for several days. Mt. Sabine and Cape Adare came in sight on August 6th. At this period occurred a few days of the most rapid rate of drifting on record, apart from the East Greenland Current, in the Polar Regions.

From August 2nd to 6th the wind blew hard from south and south-south-west, force 8-10, and drove her 100 miles north-north-east in that time; and in the next few days a wind of the same force, but from south and south-south-east, drove her 88 miles north-west by north.¹

The ship's carpenter began to make a jury rudder, but it could not be shipped in the pack. On August 23rd Cape North was passed at a distance of about 50 miles, and for the next month the rate of drift was little more than 2 miles a day. Probably there was some backward and forward movement, passing more than once over the same positions. During a blizzard on September 5th the mizzen wireless mast was carried away. On the 22nd Sturge Island of the Balleny group bore 90 miles to the north and Oates Land was seen to the south. The *Aurora* had then drifted about 700 miles approximately parallel to the coast of South Victoria Land.

On October 3rd and again on the 14th Oates Land was seen, and "in November land was seen to the south very far off; if correct, this last observation extends Oates Land 80-90 miles farther north-west beyond the Wilson Hills."² Only two soundings, the positions of which could be fixed definitely, were taken during the drift. The first of these was on November 17th in latitude 66° 40' S. and longitude 154° 45' E. and was of interest because the depth was only 194 fathoms on mud and small stones, indicating the existence of land at no great distance to the south. Stenhouse wrote: "We panned out some of the mud and in the remaining grit found small specks of gold."³ On November 24th, when some miles to the north-west of where this sounding was taken, the other one gave 700 fathoms and no bottom, showing that the *Aurora* had drifted off the continental shelf.

The year 1915 ended and the New Year began without apparent

¹ Mr. J. M. Wordie in the "Geog. Journ.," Sept., 1921, 222.

² *Ibid.*, 223.

³ "South," 325-6.

change in the conditions ; but on February 12th, 1916, the disintegration of the floe set in and the last stage of the drift was entered upon. During this time the *Aurora* floated again and was found to be leaking, though her greatest danger was that she could not escape from the ice, which rammed her unmercifully. Steam could not be raised because of the shortage of coal until, on March 1st, the situation had become so dangerous that the engines had to be started at all costs, and on the 2nd the ship began to work ahead. Little progress could be made till the 11th when the pack opened considerably. On the 12th and 13th the jury rudder was shipped and the main pack cleared, the last of the ice being seen on March 14th.

In a battered state the *Aurora* limped towards Port Chalmers, New Zealand, which was reached on April 3rd, 1916, after the ship had been taken in tow by a tug on the 2nd. Heavy weather had carried away part of the jury rudder ; and indeed the whole voyage had been full of difficulty and danger which Stenhouse had met in the proper spirit.

The *Aurora's* eleven months' drift was valuable in showing the direction and force of the current during one season. What variations, if any, this current may show from year to year are still to be discovered. It is interesting to notice "the extraordinarily rapid movement throughout the winter months and the slow movement in the summer."¹ During the first 79 days the rate averaged $2\frac{1}{2}$ miles a day. From then, July 24th, till September 5th, 1915, the rate varied between $9\frac{1}{2}$ and 15 m.p.d. During the last 191 days of the drift the average rate of progress was only $1\frac{1}{3}$ m.p.d. The probable distance drifted on the *Aurora's* course was 1,191 miles and the average rate of movement throughout, 4.2 m.p.d. It is interesting to note that the rate of the *Endurance's* drift, for a distance of 1,816 miles, is given at 4.1 m.p.d.²

When Shackleton reached Stromness after his crossing of South Georgia he heard that the *Aurora* had been blown out to sea leaving ten of his men marooned on Ross Island ; but he could do nothing for them till the twenty-two *Endurance* men had been rescued from Elephant Island. Even when this was successfully accomplished he was faced by the obstacles and hazards created by the Great War which continually hampered his movements. He took Wild's Party in the *Yelcho* to Punta Arenas and from there

¹ "Geog. Journ.," May, 1916, 374.

² *Ibid.*, Sept., 1921, 223.

they all went to Valparaiso and Santiago. The Chilean Government sent them across the Andes in a special train and Wild brought them home, except Shackleton and Worsley, who set off immediately to do what they could for the Ross Sea Party. They could not reach New Zealand until the beginning of December, 1916, and then they found the *Aurora* Antarctic Relief Expedition fully organized and the ship nearly ready for sea.

The British, Australian and New Zealand Governments had risen to the occasion before Shackleton returned to civilization and the Admiralty had appointed a strong committee, with Admiral Sir Lewis Beaumont as chairman, to take steps for the rescue of the Ross Sea Party. The Royal Geographical Society, Sir Douglas Mawson and Dr. W. S. Bruce had lent their assistance and the *Aurora* had been repaired and provisioned. Captain J. K. Davis had been appointed Commander of the expedition, than whom, as Dr. H. R. Mill said, in Shackleton's absence, no better leader could be found.

When Sir Ernest emerged from the Antarctic, Captain Davis at once handed in his resignation to the Relief Committee. Shackleton naturally wished to command the expedition for the rescue of his own men; but the committee felt that, as the *Aurora* was on the point of sailing, any change of commander might cause disorganization, and Shackleton showed his true greatness by signing on as a supernumerary officer under his old lieutenant. He made things easy for his new captain and former subordinate, and Captain Davis assures us that, as of old, Shackleton was the most popular man on board the ship.

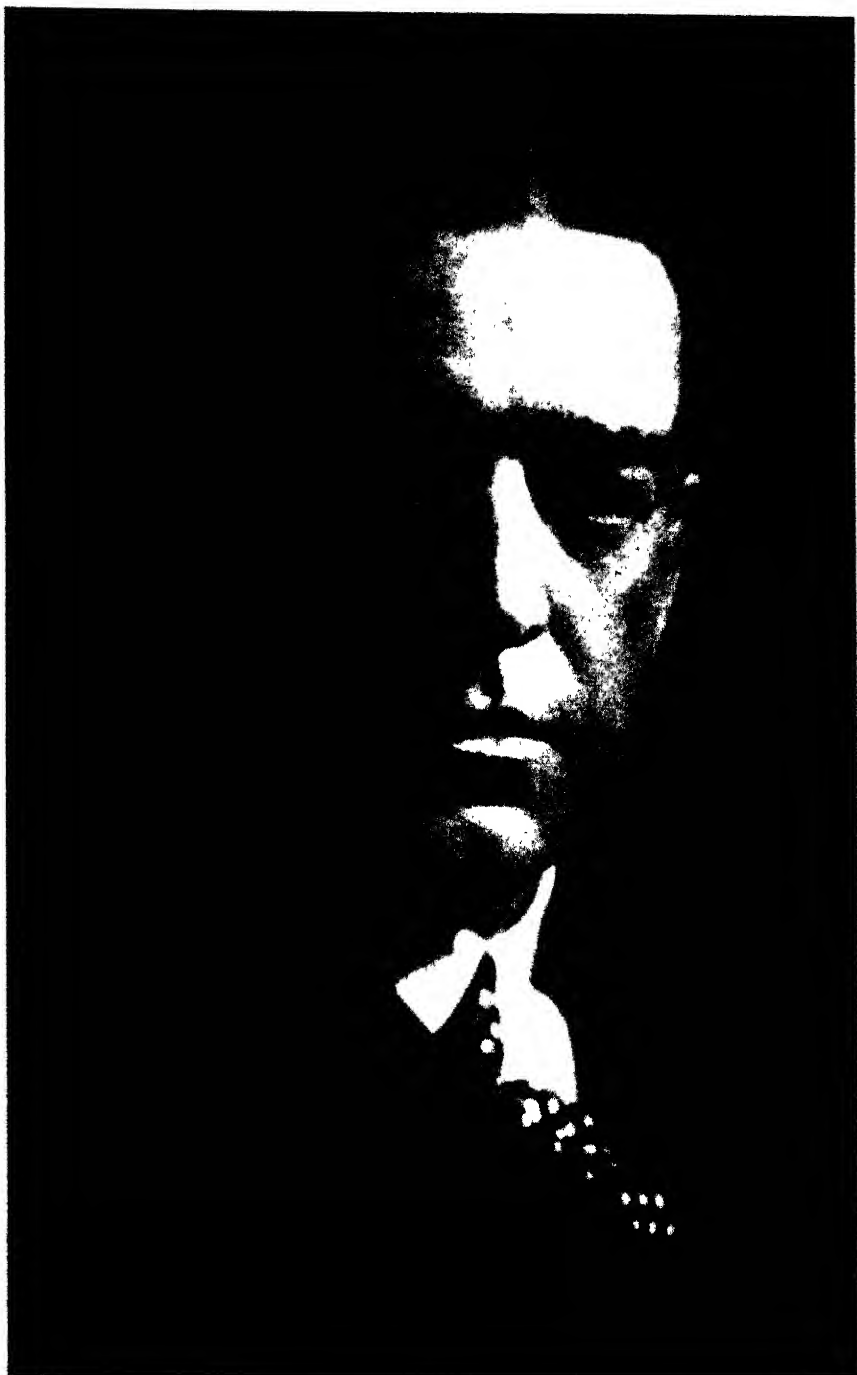
The *Aurora* left Port Chalmers on December 20th, 1916; Shackleton was to take charge of all shore operations. Mt. Sabine was sighted on January 6th, 1917, and the Ross Sea entered next day. On the 10th Cape Royds was reached and a letter found stating that the men were living at Cape Evans. They were soon on the ship and a further search was made for any sign of Mackintosh and Hayward. None was discovered and the *Aurora* returned to Wellington on February 9th. Before leaving for England to begin his war service, Shackleton lectured for the benefit of Mackintosh's widow, for whom he raised £1,000.

Thus this extraordinary expedition came to an end. It was the culmination and completion of our heroic period of Antarctic exploration. For the severity of the contest that its members had to wage with Nature in her more savage moods it is unexampled

in modern times and perhaps in history. Shackleton and his men at once took their place in the less agreeable conflict of the European War ; but whatever they accomplished in the fighting forces, nothing could exceed or dim the glory of their achievements in the cause of Science. Dr. H. R. Mill finely said :

The Polar Regions have seen many triumphs and tragedies of exploration in the last 400 years and . . . we cannot say that the past has left much chance for breaking the record of human endurance, courage and resourcefulness. . . . Nevertheless, we are inclined to place this story of the *Endurance* at the very head of all records of polar achievement on account of the variety of the risks encountered, the accumulated difficulties overcome, and the almost incredible deliverance of the whole ship's company. The Britons of the twentieth century in this adventure stand in the front rank of adventurers of all time. . . . Shackleton did things that other explorers might have done, but which no other explorers, as a matter of fact, have done.¹

¹ "Geog. Journ.," Jan., 1920, 51.



SIR ERNEST SHACKLETON, C.V.O., LL.D.

CHAPTER XIII

SHACKLETON'S LAST VOYAGE

WHEN the European War first distracted civilization a large amount of Antarctica had been brought within the realm of knowledge. In the most popular theatre of operations, the Ross Dependency, 300 miles of coastline had been extended approximately to 800 miles; the Beardmore district had been opened up, the Queen Maud Range discovered, the Geographical and Magnetic Poles attained. Hundreds of miles of new country had been charted in other parts of the southern continent and much intensive scientific work carried out in the immediate vicinity of the various expeditions' bases. Then came the War, in which all Antarctic explorers took part.

On returning to London in 1917 from his *Endurance* odyssey, Sir Ernest Shackleton was received by the King, and his war service began with honorary propaganda work under the Foreign Office in South America, where he had always been popular. Before leaving England to take up these duties, Sir Ernest and Lady Shackleton were received by Queen Alexandra, and the King commanded Sir Ernest to give his *Endurance* lecture and show his film at Sandringham. In March, 1918, the War Office placed him in charge of the winter equipment for the North Russian Army with the rank of Major, and he was attached to the Staff of General Sir Charles Maynard. He returned to civil life in 1919 and spent most of his time lecturing, until early in 1920 when he made up his mind to embark upon one more expedition. He knew this would be his last command, as he was then 46 years of age; and he took up an idea that had originated when living on the ice floes of the Weddell Sea.

Commander Worsley recorded in his diary the origin of this expedition, as follows:

Sir Ernest optimistically discussing an expedition to the lands N. of Canada when this one is thro'. We look up all the maps and books on the subject that we can lay our hands on, and wax enthusiastic about our next trip before we can definitely settle how the angel we are going to get out of this one.

Shackleton's one unfulfilled desire at this time was to re-establish British prestige in the Arctic. He "felt a strong desire to clear up the mystery of the North Pole and for ever settle the Peary-Cook controversy."¹ He was able to command the services of the largest number of trained men gathered together for such a purpose in modern times.

He submitted a scheme to the Royal Geographical Society in 1920 which met with their full approval, though it would have been very expensive to carry out. The Dominion of Canada, however, claimed all the land that would be used for the expedition's bases, and Shackleton visited Ottawa where he obtained the promise of a large grant from the Canadian Government. One day, after his return, as he was walking along Pall Mall, he was hailed from a large automobile. The speaker was John Quiller Rowett, an old Dulwich schoolfellow, who was interested in financing schemes for scientific research and who promised Shackleton several thousand pounds towards the new venture, the preparations for which then began.

A Norwegian sealer of 125 tons was purchased and renamed the *Quest*. Shackleton's men were gathering, several of them from remote regions where they abandoned their businesses in response to his call. Commander Wild says that some had waited for two years, so that they might be free to join when required. Dr. Macklin set out for Canada to collect a hundred sledge dogs. Commander Worsley left his own ship to discharge her cargo on the Humber and hurried to London—and then came a great shock. The Canadian Government initiated a policy of retrenchment and withdrew its financial support. This placed the expedition in a desperate position until Mr. J. Q. Rowett, with great generosity, offered to bear the whole of the cost, amounting to tens of thousands of pounds. He did this purely out of friendship to Shackleton and in the interests of science. Thus was born the Shackleton-Rowett Expedition, and it was never again harassed by debt.

The Arctic Scheme was now cancelled and a scientific voyage in the Antarctic and sub-Antarctic zones decided upon. Dr. Macklin was recalled from Canada as no dogs would now be required. Commander Wild was Second-in-Command of, and Commander Worsley Hydrographer to, the expedition, the latter being also the Sailing Master, and Lieut.-Commander D. G. Jeffrey, D.S.O., the Navigator, of the *Quest*. Nine Antarctic

¹ "Shackleton's Last Voyage," Commander Wild, 2.

veterans, including Shackleton, sailed on this expedition ; and a tenth who has since become famous was Captain (now Sir Hubert) Wilkins, already an experienced polar explorer, who served as naturalist. The Admiralty and Air Ministry lent scientific apparatus. There were no forward hands and the forecabin was utilized for a biological laboratory and geological workroom.

There had been thousands of applicants, as usual, for these expeditions, and Shackleton took out two boy scouts. One of them had to be sent back from Lisbon on account of seasickness, while the other, James W. S. Marr of Aberdeen, has subsequently become an experienced explorer. The change in the theatre of operations from the Arctic to the Antarctic had left very little time for preparation, if a whole season were not to be wasted. When the *Quest* sailed from London on September 17th, 1921, Wild wrote : " The new expedition had been organized, equipped and got ready for departure all within three months. No other man than Sir Ernest would have attempted it, and no other man could have accomplished it successfully."

The King and Queen Alexandra received Shackleton before he joined the ship at Plymouth. The *Quest* was soon found to be both lively in motion and slow, the result of which was that everyone was severely tried when storm after storm was encountered, and Shackleton did not leave the bridge for five days. He had not been well before sailing, though this was kept a secret at the time and he seemed happy when in his ship. Worsley, however, thought that his health was not what it had been in the *Endurance*. There was continual trouble with the *Quest's* engines, which made it necessary to put into Lisbon for repairs, thereby causing a week's delay that extended to six weeks before Rio de Janeiro could be left. A complete overhaul had to be made here and it was then impossible to call at Capetown where an aeroplane and other apparatus, stores and equipment, had been sent.

Shackleton had a heart attack on December 17th which showed his staff that there was something radically wrong with his health ; but on putting to sea next day he seemed to Wild his old cheery self once more, and he was tested by the most violent storm in the whole of his seafaring experience. On December 28th, 1921, after several days of the gale, the ship had to be hove-to and oil poured on the troubled waters. The following day, when the worst of the storm had passed, a leak was found in the furnace that might have stopped the whole expedition. Another gale was encoun-

tered on the night of the 30th to 31st and Shackleton's cabin became too wet for him to sleep in; he therefore turned in on a wardroom bench, as he would not deprive any man of his bunk. Commander Wild writes:

During the long spell of bad weather he had spent nearly the whole time on the bridge, and though I repeatedly suggested to him that he should lie down and rest, he would not do so. . . . I began to feel a little bit uneasy, for it seemed to me that he was doing too much.

Shackleton's last storm at sea was over, and with the New Year, 1922, he resumed his diary which had not been written up for several weeks. The following is one of his last entries:

January 2nd: Another wonderful day. . . . At 1 p.m. we passed our first berg. The old familiar sight aroused in me memories that the strenuous years had deadened. Blue caverns shone with sky-glow snatched from heaven itself, green spurs showed beneath the water. . . . Ah me! the years that have gone since in the pride of young manhood I first went forth to the fight. I grow old and tired, but must always lead on.

As the mountains of South Georgia hove in sight he became his old vivacious self, pointing out to the new-comers where his adventures had taken place. Grytviken was reached on January 4th, 1922, Sir Ernest remarking as the *Quest* entered the harbour: "The cross has gone from the hill-side." This cross had been erected by the crew of the *Deutschland* in memory of the member of Filchner's expedition who had been lost there. The *Quest* was brought up in the *Endurance's* old anchorage and Shackleton went ashore, returning for dinner in excellent spirits. Most of the staff then went fishing, but Shackleton and Worsley remained chatting on board.

Dr. Macklin was taking the 2-4 a.m. anchor watch that night, (Jan. 4th to 5th) and heard a whistle from Shackleton's cabin. On going in Sir Ernest said: "I can't sleep to-night, can you get me a sleeping draught?" He explained that he was suffering from severe facial neuralgia and had taken fifteen grains of aspirin. "That stuff is no good; will you get me something that will act?"

I noticed [writes Macklin], that although it was a cold night he had only one blanket and asked him if he had no others. He replied that they were in his bottom drawer and he could not be bothered getting them out. I started to do so, but he said, "Never mind to-night, I can stand the cold." However, I went back to my cabin and got a heavy Jaeger blanket from my bunk, which I tucked round him. He was unusually quiet in the way in which he let me do things for him. . . . He talked of many things quite rationally, and finding

him in such a complacent mood, I thought it a good opportunity to emphasize the necessity of his taking things very much more quietly than he had been doing. . . . "You are always wanting me to give up something. What do you want me to give up now?" These were his last words. He died quite suddenly.¹

Sir Ernest had written in his diary before turning in :

At last, we came to anchor in Grytviken. . . . A wonderful evening.

In the darkening twilight I saw a lone star hover
Gem-like above the bay.

These were his last written words, and with such thoughts he went to his rest.

At 8 a.m. on January 5th, 1922, Commander Wild, who succeeded to the command of the expedition, called all hands and told them that they would carry out the programme of exploration as arranged. Shackleton had died of *angina pectoris*. His body was embalmed and reverently borne to the Lutheran Church at Grytviken. No wireless communication could be established with the rest of the world, so that Lady Shackleton's wishes as to the interment could not be known until a ship reached Montevideo. Here, therefore, Sir Ernest's body was taken by Dr. Hussey, though everyone on the *Quest* believed that the widow would prefer him to be buried at South Georgia. This proved correct and he was afterwards carried back to lie at the gate of Antarctica.

The *Quest* left South Georgia on January 18th, 1922, and Zavodovski Island in the South Sandwich Group was sighted on the 20th. A running survey was made of the island, and soundings taken. Sulphur fumes, rising from cones on its south side, distressed the throat and eyes of all in the ship. Three days later the ship was leaking badly and this, added to the lateness of the season, made Wild doubt the wisdom of going on any farther with the expedition ; but he felt it his duty to make an effort to accomplish something. On January 30th no sign appeared of the Pagoda Rock in its charted position, latitude 60° 10' S. and longitude 4° 47' E. ; a sounding here gave 2,980 fathoms. Observations of atmospheric and oceanic conditions were carried out by the staff continually. Open pack was entered in latitude 65° 7' S. and longitude 15° 20' E., Wild heading south through it. On February 5th, when the pack was heavier, a sounding of 2,330 fathoms was taken in latitude 66° 12' S., and longitude 16° 20' E. By the

¹ "Shackleton's Last Voyage," 64-5.

7th it was impossible to proceed farther and next day the *Quest* was turned to the north from latitude $67^{\circ} 40' S.$ and longitude $17^{\circ} 6' E.$, where the depth had been 2,356 fathoms.

On February 9th Wild was able to head the ship again to the south for two days ; on the 11th a depth of 1,555 fathoms on grey mud was found in latitude $68^{\circ} 52' S.$ and longitude $16^{\circ} 55' E.$, which was 608 fathoms less than a sounding taken 49 miles to the north. The *Quest's* farthest south was in latitude $69^{\circ} 17' S.$ and longitude $17^{\circ} 9' E.$, where 1,089 fathoms were found, which showed a shoaling of 466 fathoms in 29 miles. Admiral Bellinghausen had been the first navigator in these waters, reaching latitude $69^{\circ} 6' S.$ in $18^{\circ} E.$ on February 14th, 1820. He was followed here by John Biscoe, who attained a latitude of $69^{\circ} S.$ in $10^{\circ} 43' E.$ on January 28th, 1831.

Wild dare not risk the freezing in of the ship for the winter ; she was therefore turned to the north on February 12th, though land was thought to exist at little more than 50 miles to the south. On February 14th there were fears that the *Quest* was beset, but next day the ocean swell was felt, and on the 16th 77 miles of northing were made. Another attempt to push south was made from February 18th to 20th ; on the latter day heavy pack compelled Wild to turn to the west and the following day north-west. On the 22nd the ship regained the open sea ; but next day she was headed south once more through a "sea of milk," this appearance being due to ice in small round pieces, like snowballs, covered with a fine powder. This last attempt to make a high southern latitude was abandoned on February 24th. Early in March, 1922, the Weddell Sea was entered and a search made for Ross's "appearance of land" without seeing any indication of it. On March 13th a depth of 2,331 fathoms was found in latitude $64^{\circ} 11' S.$ and in longitude $46^{\circ} 4' W.$ and the following day the ship was beset, remaining frozen in, but not being subjected to pressure, until she was released on the 21st. Oceanographical work, meanwhile, was carried out.

On March 25th the *Quest* reached Elephant Island and anchored near Cape Lookout at the south-western extremity of the island. A landing was made here and some sea-elephants secured. The following day the ship was taken to the north-westerly point of the land, and another party went ashore. On the 27th Cape Wild was reached, where the twenty-two *Endurance* men had passed so many dreary months ; but a hurricane arose and the *Quest* was

forced to run before it to South Georgia, thus following the course of the *James Caird*. An enormous breaking sea that half filled the foresail and flooded the cabins struck the *Quest* on March 31st.

The northern end of South Georgia was rounded on April 5th, 1922, and Leith Harbour entered early the following morning. Here the Antarctic work of the expedition ended and here Dr. Hussey was found after his return from South America with Sir Ernest Shackleton's body. He had arrived at Montevideo on January 29th, 1922, and cabled the news to England. Lady Shackleton believed that Sir Ernest would have preferred to be buried in South Georgia, so a memorial service was conducted in the English Church at Montevideo, and the coffin was then borne on a gun-carriage through streets lined with troops to the *Woodville* in the harbour. A salute of seventeen guns was fired and the Marines sounded the Farewell.

The whole world mourned the loss of the great explorer, a loss felt the more poignantly because Sir Ernest was relatively a young man, for he was only 47 years of age. The funeral took place at South Georgia on March 5th, 1922, and Shackleton was buried very simply in the little cemetery on the hill at Grytviken. When the *Quest* returned there, Wild and his companions erected a cairn, crowned by a cross, on a prominent site at the entrance to the harbour and in full view of all vessels. "So we said good-bye to the 'Old Boss,'" writes Wild, "and I who have served with him through four expeditions know that if he could have chosen his resting-place it would have been just there."

Here—here's his place, where meteors shoot, clouds form,
Lightnings are loosened,
Stars come and go! Let joy break with the storm,
Peace let the dew send!
Lofty designs must close in like effects:
Loftily lying,
Leave him—still loftier than the world suspects,
Living and dying.

Commander Wild's tribute to his old chief must have pride of place for he served on all Shackleton's expeditions, twice as his Second-in-Command, and his love for him was deep.

No one knew the explorer side of his nature better than I . . . I have known personally and served with all the British leaders of exploration in the Antarctic since my first voyage in the *Discovery*. For qualities of leadership and ability to organize Shackleton stands foremost and must be ranked as the first explorer of his day.

Many will agree with Commander Wild's opinion if only because Sir Ernest Shackleton was the only Antarctic explorer to initiate, organize and command, single-handed, three expeditions, though he did not live to complete his last venture. Each of these was a purely private enterprise for which he alone was responsible. The remarkable blend of English and Irish blood in Shackleton's veins made him what he was. Fundamentally, he was of the bulldog breed, with Atlantean shoulders, and inflexibility engraven in the lines of his handsome face. Yet his Irish characteristics gleamed forth every day of his life; in his impulsiveness and generosity; in his personal magnetism and unconventionality; in his intuition of danger and quickness to avert it; in his intolerance of officialism and love of liberty; in the poetry and romance of his nature. His biographer wrote: "It was his nature to push into the unknown, to take great risks. . . . His nature impelled him always to be doing things, especially difficult things, above all big things, and to be doing them with all his might."

There was a sacred side to his character that seldom came to the surface, but it appeared in the explanation he gave of his party's escape from death when returning from the polar plateau in 1909 and in his account of the crossing of South Georgia. The same reasonably reverent outlook was shown when the *Endurance* was crushed and he wrote: "Human effort is not futile, but man fights against the giant forces of nature in a spirit of humility. One has a sense of dependence on the higher power."

The tribute of many memorial services was paid to the great explorer, the most impressive being at St. Paul's Cathedral where the Royal Family, the Admiralty and the Royal Geographical Society were represented and Sir Ernest's comrades from four expeditions attended. In due time a permanent memorial was erected over his grave in South Georgia and unveiled by His Excellency the Governor and Commander-in-Chief of the Falkland Islands and its Dependencies on February 24th, 1928. The National Memorial at the Royal Geographical Society was unveiled by the Marquis of Zetland on January 9th, 1932.

The glory of Shackleton's achievements has not faded with the years, but on the contrary he seems to tower the higher, like some tall peak, as we recede from him. He "possessed many of those qualities which detach a man from the background of his contemporaries to be silhouetted for ever against the sunset sky of time."¹

¹ "The Life of Sir Ernest Shackleton," 285.

CHAPTER XIV

THE WORK OF THE WHALERS AND THE *DISCOVERY* COMMITTEE

WHALING has now passed, definitely and preponderantly, from the Arctic to the Antarctic where it is conducted on a scale never known before. Instead of the little wooden sailing ship of a few hundred tons, immortalized in "*Moby Dick*," huge steel vessels of over 24,000 tons, accompanied by fleets of small steam whale catchers with high engine power, are now engaged in the business. About 10,000 men adventure annually into the Antarctic for this purpose, and thus Antarctic whaling has become an important industry. As many as 30,000 whales, or 90 per cent. of the world's supply, are now killed annually in Antarctic waters.¹ From these figures there would seem to be danger of exterminating the species hunted.

Antarctic whaling and sealing have had a considerable direct and an immense indirect influence on geographical and scientific discovery. Their earlier history has been recorded by Dr. H. R. Mill,² and Mr. Bjarne Aagaard has brought the subject, from the Norwegian standpoint, thoroughly up to date.³ The present chapter is not concerned with whaling as an industry, but only with the contribution it has made towards the advancement of knowledge in the Antarctic, properly so-called—the sub-Antarctic zone, strictly speaking, being outside our province.

During the period under consideration Antarctic whaling has aided the extension of science in more ways than one. Mr. Christensen, Sandefjord, in 1892-3, sent his whaler *Jason* to the Erebus and Terror Gulf, off Graham Land, in command of Captain C. A. Larsen. Ten years later Larsen returned in the *Antarctic*, and in 1904 founded the Cia. Argentina de Pesca, which is still flourishing at Grytviiken in South Georgia. Mr. Chr. Christensen, the pioneer of modern whaling in the Antarctic who has been

¹ Gunnar Isachsen in the "*Geog. Rev.*" (July, 1929), 399-400, published by the American Geographical Society of New York.

² In "*The Siege of the South Pole*," Chap. XVIII, pp. 362-82.

³ "*Fangst og Forskning i Sydishavet*," 2 vols., Oslo, 1931.

called the Norwegian Enderby, sent the first floating factory, the *Amiralen*, to the Falkland Islands and South Shetlands in 1905.

The British Government for many years controlled the industry by means of licences in the Dependencies of the Falkland Islands, but the bulk of modern whaling is carried on in the open sea without licence. In 1923 Captain Larsen again broke fresh ground by obtaining a licence for the Ross Dependency. To navigate a large steel ship through the pack ice into the Ross Sea seemed a daring venture; but the floating factory *Sir James Clark Ross*, (12,450 tons), and five whale catchers were safely piloted through 600 miles of floes. Captain Gjertsen, who had been an officer in the *Fram* with Amundsen, was ice pilot. The pack was entered on December 13th in latitude 65° 10' S. and longitude 178° 16' E. It was left on December 21st and on Christmas Day the Norwegian flag flew both farthest north and farthest south, for Amundsen's *Maud* was in the Arctic pack and the *Sir James Clark Ross* had reached Amundsen's old Antarctic base in the Bay of Whales.

The bay proved unsuitable for a whaling base, as it was full of pack ice, and Larsen steamed along the edge of the Ross Barrier to Discovery Inlet in longitude 170° W. and latitude 78° 30' S., where he anchored in 180 fathoms and remained for two months. The inlet was found to be 5 miles long and about 2 miles wide. Constant vigilance was necessary as the ice-cliffs were continually calving; the inlet, therefore, was not a satisfactory base. Mr. A. J. Villiers, who was in the factory ship, writes that, in addition to the menace of icebergs, "the face of the ice-cliffs suddenly crumbled away for lengths of miles at a time, in a beautiful waterfall of ice, so to speak."¹ Admiral Byrd seems to be the only other explorer who has recorded, or perhaps witnessed, this phenomenon, which Villiers says was "rather frequent" and "always accompanied by clouds of white 'ice smoke' which rose in the air and hung about the Barrier surface for sometimes half a day."²

Two scientists accompanied this expedition, Dr. Kohl the Medical Officer and Dr. S. A. Vallin; Kohl made a journey of 7 miles to the south over the Barrier. The geological, meteorological and zoological observations of these scientists are now embodied in an interesting report.³ The Blue whale that was being hunted (*Balaenoptera sibbaldi*) is the largest mammal in exist-

¹ "Whaling in the Frozen South," 179.

² *Ibid.*, 180.

³ "Zur grossen Eismauer des Südpols," Stuttgart, 1926.

ence: Larsen's smallest, killed in the Ross Sea, being 82 feet and his largest, 99 feet long. These whales average at least 1 ton in weight for every foot in length.

The *Star I*, the largest of the whale catchers, made two exploratory cruises. This boat was of 130 tons, with triple expansion engines of 550 horse-power, capable of driving her at a speed of 12 knots. In January, 1924, she left Discovery Inlet to seek a better harbour, visiting Franklin Island and then McMurdo Sound which was full of ice. The most remarkable sight witnessed on this cruise was a fight between a huge Blue whale and five Killers (*Orca gladiator*). The Killers slaughtered the Rorqual and then devoured its tongue, after which the *Star I* towed the carcase to the base.

On January 27th, 1924, a longer cruise began, on which Captain Hooper, the Administrator of the Ross Dependency, sailed in the *Star I*. An iceberg 20 miles long was seen to calve from the Barrier and the ship only escaped it by a narrow margin. No landing could be made, though it was attempted, at Cape Crozier; but evidence of the Emperor penguin rookery was seen. McMurdo Sound was entered as far as Cape Royds where the pack prevented farther progress. Shackleton's hut was not seen, but the rookery of Adelie penguins was sighted. No steam appeared above the crater of Mount Erebus. Beaufort and Franklin Islands were passed and then a course was set for Wood Bay which appears to have been clear of ice. Coulman Island was rounded, and Tucker Inlet as well as Moubray Bay were found full of ice. Robertson Bay was entered and the two huts were seen at Cape Adare, but a heavy swell prevented landing and on February 2nd the return was begun in a gale. The *Star I* made a speed of over 6 knots against a southerly blizzard; this is remarkable and shows the advantage of great engine power. On February 6th Discovery Inlet was reached after a cruise of 1,414 miles; no more suitable harbour than the inlet had been found for the mother ship.

On March 8th, 1924, the *Sir James Clark Ross* and her five satellites steamed out and found the temperature in the Ross Sea 20 degrees warmer than within the inlet. No difficulty with the ice pack was encountered and the fleet reached Stewart Island, New Zealand, on April 4th.

A month before Larsen left Discovery Inlet a notable discovery had been made by two of Messrs. Salvesen's whalers beyond Dr. Charcot's farthest south off the Fallières Coast. This discovery

was not made known to geographers for five years, and the whole sequence of events connected with it is unique.

In the year 1927, when nothing was known of it, I wrote :

The soundings (in the Weddell Sea) indicate approximately the outline of the unseen coast ; and they appear to show that it bends to the west a little south of the seventy-second parallel. While the *Endurance* was drifting in the shallow water, along this coast, no ice pressure was experienced ; but as the ship drifted over the edge of the continental shelf, or a little before, the region of pressure was entered. The unseen coast probably swerved away from the course of the drift not far from here. . . . It still seems possible that a channel, perhaps filled with barrier ice, may emerge here from somewhere to the south-west of Fallières Land.¹

More than a year after this suggestion was made—that a channel might be found to separate Graham Land from the Antarctic Continent—the following letter was received and appeared in “The Times” on January 5th, 1929² :

From CAPT. H. K. SALVESEN, M.A. (OXON.), C/O MESSRS. CHR. SALVESEN & Co.

Leith, Scotland.

DEAR SIR,—

While reading with interest your “Antarctica,” I have received from Gunners Soren Beckmann and Gustav Mathisen information additional to and on one point conflicting with your description of the West Coast of Graham Land. These gunners, while attached to the floating factories *Sevilla* and *Roald Amundsen* respectively, voyaged independently in February, 1924, far South along this coast. Both steamed in their Whale Catchers South of Queen Adelaide Island (Beckmann steamed along both lengths of the island) and both inform me that the island is low and flat—whereas on page 137 you write that Dr. Charcot states that it contains mountains of over 2,000 metres in height. (I have not the “Voyage of the *Why Not?*” available, but wonder whether Dr. Charcot was not referring to the Land East of the Island, for both agree that this does rise to imposing heights.)

Both further steamed from Cape Alexandra South towards the blank space on your map No. 6 between the Fallières Coast and Alexander Land on clear days and both were of opinion that the Fallières Coast turned sharply in an Eastern direction and that there was here either a Channel to the Weddell Sea or at least a very extensive Bay or Sea. Mathisen bases his opinion on the fact that he saw very large numbers of Blue Whales travelling North-west from this blank space. (He shot one of these.) Beckmann further claims to have seen “Tampen” (Ang. “The Point”) whence the Fallières Coast turned sharply

¹ “Antarctica : a Treatise on the Southern Continent,” 248. Richards Press, 1928.

² The original letter is in the keeping of the Scott Polar Research Institute, Cambridge.

East. The Point was high and precipitous, fringed with islands. Beyond the Point he claims to have seen an open sea stretching at least 100 miles East. The day was magnificently clear, but of course he may be exaggerating the distance he could see. Judging from the number of Blue Whales he saw travelling hence, he concluded this must be either a broad Channel or a very large Sea. On the same trip he got a very good view of Alexander Land and he is pretty certain that this is an Island.

Several factories were lying that year in Port Locroy and the passage inland of the Biscoe Islands was quite clear of ice, though there were large numbers of bergs S.W. of Cape Alexandra. Since 1924, Beckman has reconnoitred every year in this direction in the hope of leading his floating factory to a good anchorage he found in the Biscoe Islands, but he has found too much ice in the strait E. of these islands to make use of this anchorage. The Schollaert Channel on the other hand is used annually by a large number of floating factories and proves an excellent anchorage. It is most used from about the end of January till as late as April.

I am about to spend the whaling season on the waters included in your map No. 6 (to which I refer above), and am already nearing South Georgia. I send this in the hope that it may be of interest to you and your Antarctic circle of friends.

Yours sincerely,

H. K. SALVESEN.

S.S. *Saragossa*,
30/9/28.

P.S.—During the Whaling Season 1923/24 Southerly winds are said to have prevailed. These appear to have blown the pack ice North to Admiralty Bay, etc., where it was lying and leaving open the waters referred to above.

Two subjects of geographical interest arise from this letter. The first of these relates to the character of Adelaide Island. The gunners were deceived by the unusual configuration of this island which presents a low flattened dome to the west, while it towers into mountains along its eastern coast. It has the appearance of two separate islands, but Charcot nearly circumnavigated it and his data is quite conclusive. The officers of the *William Scoresby* also noticed the remarkable formation of this island.¹

The other subject, referring to the insularity of Graham Land, is of great interest and importance. It has been suggested that the gunners Beckmann and Mathisen may have discovered the western end of Stefansson Strait seen throughout its length by Sir Hubert Wilkins in 1929.² This is by no means certain, as

¹ Wiencke Island is another example. See photograph opposite page 412, "Geog. Journ.," Nov., 1931.

² See pages 256-7; also "Geog. Journ.," March, 1929, 256; April, 1931, 386; the "Scottish Geog. Mag.," March, 1929, 103; "Geog. Rev.," July, 1929, 380.

they may have seen Casey Channel or a large bay. Whatever the gunners' discovery may have been, it would not have become known but for Captain Salvesen's courtesy in writing, which suggests that the logs of many factory ships and whale catchers may contain valuable information, difficult to obtain. It may be added that, if Graham Land is an island, John Biscoe remains without dispute the first to have sighted the Antarctic Continent, though Bransfield saw Trinity Land twenty years earlier.

In 1926-7 the Norwegian whaling ship *Odd I* was in Antarctic waters, having been sent out by Consul Lars Christensen, son of Chr. Christensen, on the recommendation of Captain Larsen who had suggested that whales might be found in the neighbourhood of Peter I Island. Mr. Eyvind Tofte was in command, and South Georgia was left on January 6th, 1927. The largest iceberg on record was soon afterwards seen. It was 100 to 130 feet high and the *Odd I* steamed along its side for nine hours at a steady rate of 10 knots.¹

On January 12th the *Odd I* left Deception Island and found two small uncharted islands in Belgica Strait. Neumayer Channel was blocked with icebergs but a passage was made through Schollaert Channel. On the 13th a course was set for Peter I Island. There was "a long heavy swell from the south-west" but no ice, and there were no whale birds nor any copepods on which the whales feed. On the 15th there was still no ice, though five rorquals were seen swimming north-north-west and there were "long tracts of red copepod." At 3 a.m. on the 17th Peter I Island was reached and sailed round; it was discovered by Admiral Bellingshausen in 1821 and had only been seen once afterwards, by Charcot in 1910. The island is small, being 8 miles long, 5 miles wide and 4,000 feet high; it extends from north-west to south-east and appears to be of volcanic origin. Penguins and other birds were seen nesting on its cliffs, and although it was impossible at the time to obtain a footing on the island, a large cave and much moss were seen. Seven soundings were taken and the bottom found to be sandy, with volcanic stones. Fish, plankton and geological specimens were collected and subsequently investigated by scientists at Oslo University.

The island is almost entirely snow-covered and has no harbour. Its rocks vary in colour "from dark brown to black, or red and reddish-brown. In a few places the rock is of a dirty yellow."

¹ "Geog. Journ.," Sept., 1927, 319; "Scot. Geog. Mag.," Jan., 1929, 25-6.

"It appears to be lava and basalt, lying like steps of about 4 metres (13 feet), in thickness along the mountain side." ¹ The *Odd I* left the island in the evening of January 17th and reached Deception Island on the 22nd without having found many whales.

In 1919 the British Colonial Office appointed an advisory committee to consider the preservation of the whaling industry in the Dependencies of the Falkland Islands. This board of advisors was ultimately succeeded, in 1923, by the *Discovery* Committee which in the ten years of its existence has directed and controlled investigations of a nature and to an extent only paralleled by the great voyage of the *Challenger*. Its main object has been to make known the life history of Antarctic whales, so that if the whaling industry is ultimately to be controlled, the control will rest on data about which there is no dispute. The work, which still proceeds, is threefold: (1) A marine laboratory at South Georgia has already received and examined over 1,600 whales; (2) the *William Scoresby* has marked whales, using darts which it is hoped may be recovered and give information on whale migration; (3) the study of the whale's environment, which since 1925 has been the work, first of the *Discovery*, and latterly of the *Discovery II*. The *Discovery*, which made Antarctic history in 1901-4 under Captain Scott, was bought from the Hudson's Bay Company in 1924 and reconditioned, with Dr. Stanley Kemp as Director and Commander Stenhouse as captain. Oceanographical researches were carried out in 1925-7, after which she was chartered to Sir Douglas Mawson and her place taken by the *Discovery II*, a new steel ship specially designed for Antarctic research work. The new ship went south in 1929 and for the next two years was engaged in charting the South Shetland Islands and Graham Land. She returned to London in 1931 and was immediately given a second commission on which she has already made a complete circumnavigation of Antarctica. The work of the *Discovery* Committee deserves more than a passing mention. It is true that the leader originally disclaimed any intention of making geographical discoveries, but there is no doubt that the ships have carried out work of the utmost value to geographical science, and may even have initiated a new era of Antarctic exploration and research.

¹ "Fangst og Forskning," II, 434-8; "Scot. Geog. Mag.," Jan., 1929, March, 1929.

CHAPTER XV

THE FIRST ANTARCTIC FLIGHTS: WILKINS OVER GRAHAM LAND

GEORGE HUBERT WILKINS has been a versatile explorer in many parts of the world. After gaining experience in a subordinate capacity, in Australia, Northern Canada and the Antarctic, he has more recently led his own expeditions, pulling his own sledge, driving dogs, sailing in ships, boats and a submarine. Above all, he made the first trans-Arctic flight and had the honour of introducing flying into Antarctica.

Born in Australia in 1888, he was first engaged in engineering. In 1910 he began flying and soon became an aeronautical photographer. He initiated his polar career by serving an effective apprenticeship with Stefansson, joining the ill-fated *Karluik*, in 1913, as photographer. Wilkins was loyal to his chief, who found that he could adapt himself to anything and perform every duty with conspicuous efficiency. He readily took to living under polar conditions, and was made Second-in-Command of Stefansson's Northern Party.

In 1916 Wilkins left the Arctic for the war front and served with the Australian Flying Corps in France where he commanded the photographic section of the Australian forces. He was promoted to the rank of Captain, mentioned in dispatches, and received the Military Cross and Bar. After the War he was Second-in-Command of Cope's Antarctic venture and then became Shackleton's naturalist in the *Quest*. In 1922-5 he led a British Museum Expedition to tropical Australia and in 1926 made his first attempt to fly across the Arctic Basin from Point Barrow in Alaska. In the following year he made a flight of 500 miles over unexplored ice pack; and in 1928, with Lieutenant Eilsen as pilot, he made a great flight of 2,200 miles from Point Barrow to Spitsbergen, for which he received the gold medal of the Royal Geographical Society and similar medals from geographical and aviation societies nearly all over the world. The honour of knighthood was conferred upon him for his "conspicuous services between 1913 and 1928 culminating in the flight across the Arctic."



LAFAYETTE LTD.]

SIR HUBERT WILKINS, K.B.

His brief experience in Graham Land with Cope had made it clear that aircraft must be used for making a survey of this country, with its steep cliffs and glaciers, inaccessible on foot ; but he was engaged elsewhere until 1928 when, after his Arctic flight, he began preparations for the Wilkins-Hearst Expedition to this part of the Antarctic. The American Geographical Society sponsored the enterprise and Lieutenant Eilsen again was his pilot.¹

Two seaplanes were taken ashore at Deception Island on November 10th, 1928. One of these, the *Los Angeles*, was the machine in which the long Arctic flight had been made and was now the first complete aeroplane to enter the Antarctic Regions. Sir Hubert's plan was to make a trial flight over Graham Land to the Weddell Sea and there select an advanced base where planes could safely land. Both machines were to be taken to this base, at a distance, if possible, of five or six hundred miles south of Deception Island. From there he intended to fly over the unknown coastline to King Edward VII Land or the Bay of Whales ; while the other plane, after being used as a depot-carrier, returned to the base. This project could not be carried out in its entirety because of unfavourable conditions on Deception Island. The first Antarctic flight, on November 16th, 1928, was very short. On the 26th both machines took to the air and scouted about for several hours ; but almost insuperable difficulties had to be overcome before a long flight could be started, and considerable risks had to be taken.

It was necessary to change the undercarriages of the planes, as neither snow nor water surfaces were available for the take-off. A runway half a mile long was constructed, but its surface could not be made hard enough for the wheels that had been fitted and the first danger was that of a disaster to the heavily-laden machine before flying speed could be attained. The second danger was that of a possible forced landing, and from this Wilkins and Eilsen could not expect to take the air again. They therefore carried food for a fortnight at the rate of 24 oz. of dry provisions a day. The last danger was from the weather, which after December would be too uncertain for a flight.

On December 20th, 1928, the conditions at last being favourable, the two aviators set off in the *San Francisco* at 8.20 a.m.² Wilkins at first set his course a little west of south which carried them, at a speed of 125 miles an hour, to the west of Trinity Island, with

¹ "Geog. Rev.," July, 1929.

² See Chart No. 5.

the long level plateau of Graham Land ahead. This plateau was thought to be from 4,000 to 6,000 feet in height ; but at 8.40 a.m. the plane had climbed to 6,000 feet and was still below its level, so they swerved towards the west and passed over Brialmont Bay. At Salvesen Bay the *San Francisco* reached 8,200 feet, turned eastwards and cleared the mighty walls of rock that supported the tableland.

Graham Land, as now made known by Sir Hubert Wilkins, is a remarkable island. It is about 350 miles long ; it varies in width from 7 to 70 miles and has a perfectly horizontal summit at a height of 8,000 feet above the sea. Its vertical boundary cliffs have not been measured, but they must average at least 3,000 feet high ; and as they have never been scaled, this is the only large plateau untrodden by man. If living vestiges of earlier ages were preserved anywhere, inaccessible to the human race until the flying era, this plateau, except perhaps for its coldness, might well be their asylum.

At 9.50 a.m. the *San Francisco* was soaring over the plateau, and the islands off the east or Weddell Sea coast could be seen. Several long and narrow fjords, that nearly severed the land, were the next discovery. The course approximately followed the east coast, southwards, over the Nordenskjöld Barrier which was much crevassed near the land. At Richthofen Valley the plateau ended ; and south of this valley the whole country consisted of rugged mountains. On approaching the Antarctic Circle a channel (Crane Channel) was discovered that Wilkins believed cut Graham Land into two parts. The land to the south of this channel was approached much nearer than that to the north had been, and a mighty mass of mountains (the Lockheed Mountains) was seen to extend westwards ; they terminated eastwards at a very large and open bay into which four great glaciers descended. At 12.30 p.m., when Wilkins was 100 miles beyond the most southerly of these glaciers, a second channel was sighted. Its latitude was about $69^{\circ} 45' S.$; it appeared to isolate the whole of Graham Land from the Antarctic continent and was named, after Major R. G. Casey who is a Member of the Federal Parliament, Casey Channel.

To the south of this channel an archipelago, named the Finley Islands, was seen, and several other discoveries followed in rapid succession. First, the separation of all Graham Land from the continent became perfectly clear. Then, as the plane passed over the Finley Islands at a height of 2,000 feet, the large strait referred to in the last chapter came in sight. It was from 20 to 30 miles

wide and 100 miles long, and was named by Wilkins Stefansson Strait. On its southern side lay one of the greatest discoveries, for "a smooth slope, wide and unbroken, reached southward. It was not marked by even a speck or shadow and would not show on a photograph."¹ This seemed to be part of the great snow-clad continent and was named Hearst Land.

The mainland here was bounded "by a comparatively low ice cliff, which because of the angle of the sun, failed to show distinctly in the photograph"; but Hearst Land appears to be typically Antarctic and resembles the Mawson countries that slope down from the interior to ice-cliff coasts. It seems probable that Stefansson Strait was filled with pack ice.

At about 1.0 p.m. the plane was flown a few miles over Hearst Land, to latitude $71^{\circ} 20' S.$ and longitude $64^{\circ} 15' W.$, and then swung round for the return flight. It was impossible to land because of the wheels on the undercarriage; with skis the aviators could have descended almost anywhere near their turning point. About half the fuel had been used and storm clouds were forming in the north, threatening the return to their base. A most successful flight had been made and nearly all the new country had been photographed.

A more direct course was set on the return, and a higher speed (about 130 miles an hour) was maintained than on the outward flight. This course was farther from the land until the plateau was passed over a little to the east of the outward route. Wind and mists were encountered before the end of the flight, and the landing field was photographed from a height of 5,000 feet through an opening in the clouds. A safe landing was made ten hours after leaving, and thus one of the most remarkable and important flights on record was successfully completed.

Another flight was made on January 10th, 1929, to confirm some of the observations already taken and "to prospect for a more suitable base accessible by ship and where skis could be fitted. The chief difficulty throughout appears to have been the lack of snow at Deception Island."² The whole of this season's work was intended to be preliminary to the long flight, of at least 1,300 miles, from Hearst Land to King Edward VII Land; and both the planes were stored on Deception Island over the winter in readiness for the second season's work. Sir Hubert hoped to establish by aerial transport an advanced base on Hearst Land.

¹ "Geog. Rev.," July, 1929, 367-8.
C.S.P.

² "Geog. Journ.," March, 1929, 255.
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In December, 1929, he was back again at his base where he found the conditions for starting a long aerial voyage worse than during the previous year. It was impossible to improvise a runway from which the planes could take off with heavy loads; but this emergency had been foreseen and the *Discovery* Committee had agreed to make the *William Scoresby* available for assistance. On December 12th, therefore, the ship steamed southwards, carrying the flying expedition in search of a landing-place.¹

The first call was made at Port Lockroy on Wiencke Island. Then the ship passed through Bismarck Strait into the Bellingshausen Sea and continued as far as the south-western end of Adelaide Island where it was hoped that suitable ice would be found for taking off with skis. No ice field was seen, however, of half the size required, and the sea was too rough for taking off from the water, so on December 18th, the *Scoresby* returned to Port Lockroy. Here it was found possible to use floats, and a flight was made the following day. It was necessary to fly at a height of 10,000 feet to clear the mountains. The course at first was south-east over Flanders Bay, from the head of which the distance was less than 25 miles to the head of Evans Inlet on the east coast of Graham Land. As the engine was not running perfectly, Wilkins decided to fly along the west coast, which had not been followed on his previous flights. He therefore passed over both Dr. Charcot's old bases, on Wandel and Petermann Islands, and flew as far as Leroux Bay.

Here he turned sharply to the east and found that the neck of land between Leroux Bay on the west coast and Richthofen Valley on the east was only 25 miles wide. In passing over the steep slopes of this valley a head wind of 60 m.p.h. was encountered and this prevented the Foyen Coast and Crane Channel from being traced out. Sir Hubert writes: "We cannot say definitely that this channel runs right through at sea level from the Weddell Sea. . . . I still believe that Crane Channel exists. It is not a clear water channel but is filled with ice, probably shelf ice in part."²

Graham Land was nearly crossed on an easterly course; then the seaplane was turned to the north and west, the course being set for Beascocheia Bay.

¹ See "Geog. Rev.," July, 1930, "Further Antarctic Explorations," Capt. Sir Hubert Wilkins.

² *Ibid.*, 366.

The great cirque at the head of the bay is the most awesome thing I have ever seen from the air . . . [wrote Wilkins]. It was no place over which to linger. Whirling currents caught the machine. We looked down into what seemed to be a cylinder leading down to hell. . . . The drop was almost sheer, we believe, for about 6,000 feet.

Some miles of flat ice were seen in Beascocheia Bay, and in the hope of being able to use this as a more advanced base the seaplane returned to Port Lockroy; it was taken on board the *Scoresby* which proceeded at once to the bay. Early on December 20th the plane was on the ice, but the surface proved deceptive, as fresh snow covered up the inequalities; the ice beneath was badly honeycombed by the weather. The machine had therefore to be taken on board again, and the ship proceeded southwards in search of suitable ice or water.

Conditions were not favourable for a flight until towards midnight on December 27th, when a channel of moderately smooth water was found in the pack. The position of the ship was then about 150 miles north of Charcot Land; and for this land Wilkins aimed, though it was out of sight when he took to the air. A forced descent would have ended in disaster, for the water spaces in the pack over which he flew contained numerous fragments of ice. The atmosphere then became misty and it was necessary to fly at a height of less than 500 feet to see anything. "The compass was running wild. There was only the grey blank wall ahead. Beneath us," wrote Sir Hubert, "I could faintly see what appeared to be land-fast ice—ice without a crack in it." Charcot Land was known to be at least 2,000 feet high and the aviators might dash into its mountains at any moment, so they swung round. As they did so, Wilkins says: "I thought I caught a glimpse of the dark cliffs . . . looming dimly through the haze." Some anxiety was felt until the *Scoresby* was found, for there was little likelihood of being rescued after a forced landing.

The following day, December 29th, 1929, a successful flight to the south was made in clear weather. Sir Hubert took off at 7.5 a.m. and saw Alexander Island to the east, but a dark bank of cloud to the north prevented the smoke of the ship from being seen at any great distance; there was always the risk of not finding the ship on returning from the flight. The seaplane passed over pack ice as before and in an hour and twenty minutes reached the north coast of Charcot Land; it was considered to be in latitude 69° 45' S. and longitude 74° 55' W., or within 5 miles of the position

assigned to the land by its discoverer. As Wilkins flew southwards along its eastern coast he discovered two islands far away to the east in the direction of Finley Islands. It would appear, from his description, that they are in, or near, a large mass of barrier ice which fills this part of Stefansson Strait; barrier ice is also mentioned between Charcot Land and Hearst Land.

The eastern coast of Charcot Land was followed for about 60 miles which brought the plane to its most southerly point. From here Hearst Land could be seen, as on the first long flight, "a low sloping snow-covered land" to the south. Sir Hubert flew completely round Charcot Land, returning along its western coast, and thus proved it to be an island about 60 miles in diameter and situated from 30 to 40 miles north of Hearst Land. Dr. Charcot's discovery was claimed for the British Crown by dropping on the island a flag and a document attached to a parachute.

After returning to the ship, Sir Hubert wished to fly from Adelaide Island to Casey Channel and map in detail the Finley Islands; but when conditions had been unsuitable for three days he flew, on January 5th, 1930, from Port Lockroy to Deception Island. On January 25th the *Scoresby* took the seaplane along the edge of the pack to the south of Peter I Island; and on reaching longitude $99^{\circ} 50' W.$ turned southwards into an inlet in the ice as far as latitude $69^{\circ} 30' S.$ There was no difficulty in taking off from the smooth surface of the water, but a snowstorm prevented an extended flight. The ship then moved to latitude $70^{\circ} 10' S.$ in longitude $100^{\circ} 45' W.$ and there waited for better weather.

At 2 p.m. on February 1st, 1930, the last flight was made due south as far as latitude $73^{\circ} S.$, but only the pack and icebergs were seen. The ice at the farthest point was said to be "firmly attached to the mainland," though no land was with certainty sighted. Thus ended a season that must have been disappointing to Wilkins who had expected to fly over the unknown country to Admiral Byrd at the Bay of Whales; but he had accomplished a great deal of important, if less spectacular, work.

In reviewing his two seasons' results, we must notice that he showed the scientific value of the seaplane in making preliminary surveys. Maps and photographs can be made from the air much more quickly than from sea or land, though special mapping cameras must be used by trained aerial surveyors. Sir Hubert was able to chart, approximately but with fair accuracy, probably 80,000 square miles of country in 10 hours. He found that

Graham Land, assumed to be a peninsula, was a series of islands, and he proposed to name them the Antarctic Archipelago. Mr. J. M. Wordie considers this discovery to be perhaps the most important in Antarctica since Shackleton discovered the Beardmore Glacier and Polar Plateau in 1908.¹ Sir Hubert looked down on the unique plateau of North Graham Land, raised like a huge stone altar above the sea. He discovered mountains and glaciers, fjords, channels and islands too numerous to mention ; and lastly he discovered, probably, a new portion of the Antarctic Continent. Having been a professional aeronautical photographer, his camera pictures taken from the seaplane are most inspiring ; and his confirmation of Charcot Land is very satisfactory. Altogether Sir Hubert carried out a fine piece of work and was a pioneer of a new age in polar exploration—the Aeronautical Age.

¹ "Geog. Journ.," March, 1929, 254.

CHAPTER XVI

THE AMERICAN AERONAUTICAL EXPEDITION: BYRD ON THE BARRIER

THE name of Richard Evelyn Byrd shines brightly, even in the galaxy of brilliant Americans to which he belongs, for he surprised and delighted the world for several years by successively beating his own, and other, flying records. He was born in Virginia in 1888 and at the tender age of 12, when most boys are content with games, made a solitary trip round the world. Even this excursion must have left some desires still unfulfilled, for after graduating from the United States Naval Academy and commanding his country's naval forces in Canadian waters during the Great War he became, in 1925, Flight Commander to the MacMillan Greenland Expedition. He then organized and carried out an enterprise that enabled him and Floyd Bennett, flying from Spitsbergen, to be the first men at the North Pole.¹ In 1927 Byrd made the third transatlantic flight from America to Europe, the first of these oceanic flights with four passengers, and the following year he set out on the greatest polar aeronautical expedition ever undertaken.

It was fitting that the United States should not be deprived of whatever glory there may have been in first attaining a difficult point; but it was even more gratifying that the greatest of American nations should have launched a modern Antarctic expedition. The national prestige of the United States needed re-establishing in the Antarctic as well as in the Arctic, and Byrd did both. Nearly a hundred years ago the American Antarctic Expedition under Lieutenant Wilkes made grandiose claims of geographical discovery that time has largely dissolved; hence Byrd sailed for the farthest south with the best wishes of many distant admirers, one of whom has now the pleasure of reviewing his plan and its achievement.

Captain Amundsen's influence appears in the formation of Byrd's scheme, and Amundsen rendered assistance by finding one of the ships—the *Samson* of Tromsø, built in 1882, whose name

¹ Admiral Peary not having reached it. See "Robert Edwin Peary, a record of his Explorations," Grant Richards & Toulmin, 1929.



Photograph from WIDE WORLD PHOTOS]

REAR-ADMIRAL R. E. BYRD, U.S.N. (RETIRED)

was altered to the *City of New York* and shortened to *City*. She was a wooden vessel, rated at 515 tons, with inadequate engine power. The *Chelsea*, an iron merchantman of 800 tons, was also purchased and her name changed to *Eleanor Bolling* in honour of Byrd's mother. As these ships cost £57,000 it will be understood that Byrd had the usual financial difficulties of most explorers. His intention was to establish a base at the Bay of Whales, Amundsen's old headquarters, and from there to make several aerial voyages and other journeys, one flight being to the South Geographical Pole.

Byrd's Expedition was characteristically American and worthily upheld the credit of the United States. It was on the grand scale, as seen by its total cost of £150,000.¹ Thus it was the largest expedition in our period, and set up a whole series of new records. Byrd's complete personnel, including the officers and men of his two ships, totalled eighty-three men. The American expedition far exceeded all others in utilizing the resources of modern engineering, and its transport system was colossal. "Efficiency" is the second word in Admiral Byrd's book,² and in this feature also the expedition has never been equalled.

About 600 tons of equipment and supplies were carried to New Zealand by four ships in September, 1928, the whalers *Sir James Clark Ross* and *Larsen* assisting the expedition ships. When the *City* sailed from Dunedin on December 2nd she had on board the Shore Party, with transport, stores and materials for the wintering station, sufficient to carry out the greater part of the work, in the event of the *Bolling* failing to reach the base. The *City* was towed by her consort, through tempestuous weather, to the northern edge of the ice pack, which was reached on December 10th, 1928. Here 90 tons of coal were transferred from the *Bolling* to the *City*. The former then turned back for New Zealand and the *Larsen* was met by appointment to tow the *City* through the ice. At this time about fifteen ships, mostly whalers, were in the vicinity of the Ross Sea pack ice—a striking contrast to the solitary voyages of the *Discovery*, *Nimrod* and other earlier expedition ships. On December 15th the *Larsen* of 17,000 tons took up the tow and the pack was entered in longitude 178° E. and latitude 67° 48' S. The whaler whose engines developed 8,000 horse-power had no diffi-

¹ The total cost of Scott's last expedition, including the relief fund, was also about £150,000.

² "Little America," Putnam's, 1931, to which acknowledgment is made.

culty in towing the little ship, but it was far from easy for the *City* to avoid bumping the *Larsen's* propeller when brought up by the floes. By unremitting vigilance and good seamanship all damage was avoided and the Ross Sea entered on December 23rd when the ships went their several ways.

Byrd laid his course for Discovery Inlet and spent part of a day there.¹ He supported Villiers as to the instability of the Barrier edge, for he also saw the ice cliffs crumble into the sea, and wrote : " Once, as I watched, the face of the Barrier miles away tore loose and fell in a showery cataract of ice." On December 29th the Bay of Whales was reached and found to be full of pack ice. Byrd set off at once with two dog teams, aiming for Framheim, Amundsen's old hut ; but neither on this day nor afterwards was any sign of the Norwegian station seen. About 100 sledge dogs had been taken by the American expedition for land transport and they surpassed all expectations. On January 1st, 1929, a site was chosen for the station on the east side of the bay at a distance of 8 miles from the open sea and the debarkation at once began.

The stores and equipment for the largest of all Antarctic bases had to be landed as quickly as possible because the *Bolling* was expected in a few weeks. The station was named Little America and its building was entrusted to the Second-in-Command of the expedition, Dr. Laurence M. Gould, Byrd's chief scientist. Captain Ashley McKinley, the aeronautical surveyor, was Third-in-Command and Transport Officer. Byrd's personnel was of excellent quality, though only old Martin Ronne, of the *Fram*, had previous Antarctic experience. In place of the historians who were carried on the expeditions of the Renaissance period to chronicle events, a journalist as well as a photographer represented the American Press in Byrd's Shore Party. This party of forty-two men exactly equalled the combined strength in Scott's and Amundsen's Wintering Parties of 1911, though Sir Douglas Mawson still holds the record for the largest scientific staff.

Three monoplanes on skis were taken for air transport : a Ford, with a total load capacity of 15,000 lb. and three engines of nearly 1,000 combined horse-power ; a Fokker and a Fairchild, each of 425 horse-power. A fourth plane failed to reach Antarctica. An experiment was tried with a Ford " snowmobile " for surface traction ; but Byrd's three most efficient instruments were his wireless, aeroplanes and aerial mapping cameras. The

¹ See Chart No. 4.

Bay of Whales had been selected for the wintering station because its conditions, especially the absence of high winds, seemed most suitable for flying ; and because it was one of the most important centres in Antarctica from which geographical and other scientific discoveries could be made. Amundsen's good influence may be seen here.

A trail was carefully marked from the ship to the station ; a look-out was set in the crow's-nest and no team was allowed to make the journey alone. In addition to these precautions, the departure of every caravan was telephoned from the *City* to the base and the transport was run with railway precision. On January 5th 5 tons of merchandise were transported to the station by 9 teams. The ship was able to berth nearer the base as the ice went out of the bay and on the 15th one team of 13 dogs, sledging 32 miles, transported 3,500 lbs. in the day. Most of the teams were then covering this distance every day with loads of between 700 and 1,000 lbs. The dogs each pulled about 150 lbs.

Building operations proceeded simultaneously with the transporting and included the erection of three 65-foot wireless masts. On January 15th several trial flights were made in the Fairchild monoplane and proved perfectly satisfactory. Byrd made a few minor discoveries on the Ross Barrier during one of these flights, including a new inlet 30 miles west of the Bay of Whales. He was anxious to make a flight over King Edward VII Land before the arrival of the *Bolling*, which had left New Zealand for the second time on January 14th ; and as the *City* was unloaded by the 27th he took off in the Fairchild on that day with a gross load of 5,700 lbs.

Three men made this flight, a pilot and a wireless operator accompanying Byrd. They flew towards Scott's Nunatak, nearly 200 miles to the north-east, at an average speed of 120 miles an hour. Their course followed the coast where, an hour after leaving the base, a new bay was discovered and named Hal Flood Bay. The land then was seen to consist of rolling country, and fearful crevasses appeared in its covering of ice near the base of the large triangle of which Cape Colbeck is the northern apex. Beyond Scott's Nunatak new land was seen at the rate of 4,000 square miles per hour. The Alexandra Hills appeared to the south and the land fell rapidly in terraces, scored by crevasses, from the hills to the Ross Sea. The sea was completely covered with ice, and one glacier was seen to enter it. Snow-covered land, with a rounded mountain, appeared to the east and south. A depression that may

be a channel seemed to separate this eminence from King Edward VII Land.

The Fairchild then plunged into a snow squall and Byrd was forced to turn; but as the air was clearer to the south he flew in this direction and was soon rewarded by his greatest discovery up to that time. It was interrupted for a moment by the pleasing wireless news that the *Bolling* had been sighted from the *City*; to be in communication with the ships while making an aerial reconnaissance was a triumph of modern invention. Byrd's discovery, he wrote, was "a group of highly individualistic mountains. . . . The northernmost peak we judged to be approximately 50 miles from Scott's Nunatak, in a west by south direction." Fourteen peaks were counted, the average height of which was about 1,700 feet; but the whole of this range had not been seen when shortage of fuel necessitated an immediate return to the station. Byrd named this range the Rockefeller Mountains. The flyers were then informed by radio that the *Bolling* had tied up to the *City*, and very shortly afterwards the ships were seen below the monoplane which safely ended the first important aerial voyage of discovery on this expedition.

Byrd had found a place on the east side of the Bay of Whales where the *Bolling* could unload almost directly on to the Barrier; but it had the disadvantage that the Barrier, in its turn, could and did unload itself directly on to the *Bolling* and nearly sank her. No men in the world could have acted better than these Americans and Norwegians in such times of peril; they remained cool and efficient. It was a desperate task to get the valuable equipment and stores out of the ship with the Barrier edge continually breaking away, though it was accomplished at last by discharging the *Bolling's* cargo into the *City*, so that the former could leave as soon as possible for her last trip. She sailed on February 2nd, 1929, but it was asking too much of any ship unable to steam at 20 knots to bring another cargo out from New Zealand before the winter. There were other difficulties and delays in unloading the *City*; for the Bay of Whales proved very stormy, even when calm prevailed at Little America. Time after time blizzards drove the ship out to sea where there was less danger of being dashed against large masses of ice. The *Bolling* also ran into a hurricane on her way north and being in light ballast nearly capsized. She struggled into Dunedin, however, on February 15th, by which time the disembarkation at the Bay of Whales was

nearly completed and the Fokker monoplane had successfully made her trial flights.

On February 18th both the Fokker and the Fairchild machines took off for a flight of exploration to the east, Byrd being in the former. For the first hour he took the same course as before and then snow clouds ahead necessitated a turn to the south-east. This course soon brought them, at a height of 4,000 feet, past the Rockefeller Mountains, which were found to be more extensive than they had supposed. There were at least twenty-five peaks in the range, with patches of bare rock cliffs, and the Ross Barrier lay at the southern end of the range. The monoplanes were now turned towards a high peak, resembling the Matterhorn, sighted above the clouds to the north-east; but it was soon blotted out of view and a southerly course was taken as far as latitude $79^{\circ} 30' S.$ in the hope of seeing Amundsen's "Appearance of land" between latitudes 81° and $82^{\circ} S.$ Nothing more than a dark streak on the horizon, however, was seen when fuel limitations compelled an immediate return. Byrd named the new country, near the Rockefeller Mountains, Scott Land, after Captain R. F. Scott. The flight had occupied $4\frac{1}{2}$ hours.

Captain McKinley flew off in the Fairchild almost immediately after Byrd's return, to make a photographic survey of the coastline. This flight was a striking example of the advance made in surveying methods during the previous twenty years, for Byrd directed McKinley's movements from the wireless room of the *City*. The monoplane left the coast at Hal Flood Bay in order to map the Rockefeller Mountains, and again the Antarctic Matterhorn was sighted to the east. McKinley returned in a few hours, after making a preliminary survey of many miles of country that would have occupied months on foot.

On February 21st the *City* laid down a few depots towards King Edward VII Land, for later aeroplane flights; but in the evening a gale sprang up and the rudder was frozen so that the ship became, for a short time, out of control. As winter was advancing early, Byrd sent the *City* north at once. There was a calm at the station, 8 miles away, while this gale raged in the bay. The amount of cargo, 66½ tons, disembarked and transported several miles, far exceeded that of any other expedition in our period. About two-thirds of this tonnage was from the *Bolling*, and Byrd was to be congratulated on completing the unloading without accident, in the dangerous conditions he had to face. The

dog sledges were said to have travelled a total distance of 12,500 miles in transporting this enormous tonnage to Little America.

For several days after the *City* left for Dunedin the *Bolling* was struggling southward with her second load consisting of extra stores and equipment, mainly additional houses, the smallest aeroplane and fourteen dogs. All absolutely essential goods had now reached the base, and the pack was very heavy, making it hard for the *City*, in her turn, to proceed north. On February 25th the *City* was in danger and the *Larsen* asked to stand by her. Captain Nilsen wireless-telephoned Byrd that he was prepared to take the *City's* personnel on board, as he thought the ship would have to be abandoned; but Captain Melville pulled her through with aid from the steam whale catchers and, on February 28th, took 90 tons of coal from the *Larsen*. The *Bolling* turned back for Dunedin on March 1st, and on the 12th the *City* had to be hove-to in an 80-mile gale; but she reached New Zealand a few days later.

The forty-two men were settling down to Antarctic life in the village they had erected and which resembled one of their own American "mushroom" towns of the Western States that spring up almost in a night; the three tall radio masts, being of lattice steelwork, looked like the derricks of an oil town. Three main structures were erected: the administration building, in which Byrd and the scientists lived, 200 yards from the other houses as some defence against fire; the mess hall—the abode of fourteen men; and the Norwegian House, originally intended for the machine shop and only 14 feet long and 11 feet wide. The wireless laboratory and a library of 3,000 volumes were in the first of these buildings. Numerous other little cabins and igloos were constructed and connected by a network of tunnels in the snow-drifts. This winter station had the latest improvements for polar service, with cold-resisting walls, water laid on from a snow melter, a gymnasium, telephones and other amenities of civilization.

A small but competent scientific staff formed an important branch of the expedition. There was a geologist, Dr. Gould; a surgeon who was the biologist; also two meteorologists from the United States Weather Bureau and a physicist, with two or three assistant scientists. Most of Byrd's skilled men were technicians whose work may have been equally valuable, such as Captain Ashley McKinley the aerial surveyor, the five wireless engineers and the aircraftsmen and mechanics. Many autumn activities kept

the men busy out of doors. On March 7th, 1929, a depot party set out for the south, in preparation for the Geological Journey across the Barrier the following season. They carried a wireless set and made liberal use of flags to mark the course. On the same day Dr. Gould flew off in the Fokker monoplane with two companions for the Rockefeller Mountains. Byrd was doubtful if this trip should be made, as summer was breaking up very early; but Gould was naturally desirous of examining the new mountains.

When Gould radioed his intention of returning on March 11th, a blizzard prevented the flight; and day after day there were storms either at the mountains or the base. The Depot Party returned to the station on the 13th after having encountered continual blizzards. No messages were received from Gould on March 15th to 17th and Byrd had the Fairchild monoplane prepared for a flight. Some dog teams were also warned that they might be obliged to set out for the mountains; but the weather prevented a start until the 19th and even then it was uncertain for flying. Byrd could not take off until 5 p.m., and at 6 p.m. the light was failing when a mountain was sighted and its slopes and valleys searched by the monoplane without result. A column of smoke was then seen, followed by a flash of light, and a landing was safely made on the edge of a large natural basin. Dr. Gould and his two companions were found to be well but the Fokker was a wreck. As less than an hour and a half of flying light remained, Byrd sent the others back in the Fairchild and remained alone with Gould. They were to be fetched, weather permitting, the following day.

Dr. Gould's party, after triangulating the position of all visible peaks, and collecting geological specimens, had been visited by a hurricane that had torn the monoplane from its anchorage. It had risen into flight backwards for half a mile and then crashed upon the ice. The velocity of this gust was estimated at 150 miles an hour. After this the party could hear Byrd at Little America inform New Zealand by wireless of their absence but could not send out a message. The Rockefeller Mountains were found to consist of forty peaks which extend in a crescent, open to the west, from latitude $78^{\circ} 14' S.$ and longitude $155^{\circ} 15' W.$ to latitude $77^{\circ} 35' S.$ in longitude $153^{\circ} 5' W.$

When wireless connection had been re-established, Byrd directed the affairs of his expedition from Gould's tent, being in touch with the dog teams that he had ordered out to meet him,

with his station, his ships in New Zealand and his office in New York. On March 22nd the weather moderated sufficiently for the Fairchild to retrieve him. The 125 miles were flown in $1\frac{1}{4}$ hour and the dog teams made another Antarctic record by covering 63 miles to Little America in 24 hours, thus beating Amundsen's sledging record by 1 mile.

During the whole residence of this expedition in Antarctica the worst weather of any month was in March, with only one clear day. The sun disappeared on April 17th and work became the anodyne to winter. Byrd dictated letters, wrote up his records of the expedition, worked at the maps of the Rockefeller Mountains, called and attended conferences with his various parties, besides transacting business with New Zealand and New York. In his spare time he took walks, on which he always invited a different man to accompany him. Preparations for the coming season's work were made as far as possible throughout the winter. The programme of exploration included a flight to the South Pole, a geological journey to the Queen Maud Mountains and further investigations to the east of King Edward VII Land. The polar flight was to be made by Byrd, and the sledge journey led by Professor Gould, who was expected to fulfil three duties: 1. To make a geological examination of the Queen Maud Range and Carmen Land; 2. To relay weather reports from the south to the base, so that the polar flight might be undertaken under the most favourable conditions; 3. To act as a relief unit to the polar flying men in the event of a forced landing. Gould's Party consisted of six men and fifty-four dogs.

On October 1st the new season's schedule came into force, with an earlier breakfast, and Captain McKinley relieved Dr. Gould of the administration of the station. Short excursions were made and the monoplanes overhauled. The temperature was -34° F. as late as October 13th, but, in spite of the cold, a spring depot party took loads amounting to 4,000 lbs. a distance of 7 miles toward the south. Two days later the main Southern Depot Party, supported by four teams of the Geological Party, took the trail. This party is called a supporting party to the Geological Party; it laid depots in preparation for the Geological Party's journey. On October 17th the Geological Party returned from the 20-mile Depot. The Depot Party had lengthened out to 20 miles a day, and on the 20th five teams of the Geological Party again set out to lay depots. On October 24th the Ford "snow-

mobile" was tested and found able to pull three loaded sledges at 20 m.p.h. over a firm surface. Next day it started south "obscured in a blizzard of its own making."

On October 28th the Geological Party returned from its depot-laying trip after covering the last 99 miles in 3 days. The main depot party reached the crevassed area between latitudes 81° and 82° S. on the 30th and found it worse than Amundsen had reported. They reached latitude $81^{\circ} 45'$ S., whence they returned, on November 1st. On November 4th, 1929, the Geological Party of six men, including Dr. Gould, set out on their main journey across the Barrier. About 15 miles out they met the crew of the "snowmobile" walking home; the machine had travelled a distance of 75 miles, but the soft snow and sastrugi overcame it. November 5th was an eventful day at the station because the Ford Monoplane emerged from its winter lair under its own power; it was taxied into position and well secured. The Depot Party reached Little America on the 9th, after a rapid journey on which their last day's march was of 46 miles.

Byrd's personal effort was the flight to the South Pole—a very different problem from that of flying over the North Pole. During the winter the polar flight committee had endeavoured to anticipate every difficulty and to prepare for all possibilities in connection with this great flight. The three-engined Ford was to make the voyage, the crux of which was not merely flying to the Pole and back again but how to creep through the horizontal slit between the summit of a mountain pass and the ceiling of the Ford. Every flying machine has a vertical limit or ceiling above which it cannot fly with a given load, and the estimated height of the mountain pass on the route to the South Pole was 10,500 feet. A "minimum service ceiling," therefore, of 11,000 feet was the lowest reasonable margin. The maximum weight that could be carried to this height was 12,500 lbs. Two thousand lbs. weight of fuel would be used in flying the first 500 miles to the mountains and climbing to 11,000 feet. The distance to the Pole was approximately 800 miles and the Ford's range 1,700 miles; but this would not allow enough margin for contingencies, such as head winds. Hence a fuelling depot had to be laid down before the polar flight, at the foot of the mountains, where the supply could be replenished on returning from the Pole. Even with these two flights the fuel reserve on the polar flight was estimated at only 15 per cent.

On November 17th the Ford climbed to a height of 12,000 feet, and the Rockefeller Mountains, 125 miles away, were seen. The following day, with Dean Smith as pilot, the monoplane took off on its depot-laying flight by lifting 14,300 lbs. into the air in 30 seconds with a run of 1,000 feet. Byrd was in command of the flight, with McKinley as surveyor and June as wireless engineer. The trail of the sledging parties was followed at a height of 1,200 feet and a speed of a little more than 100 miles an hour maintained. Nothing was seen of Amundsen's "Appearance of land" between latitudes 81° and 82° S. The Geological Party was sighted and the Ford dipped to within 300 feet of the Barrier surface to drop some letters. A magnificent sight soon greeted the aviators, as the coastal range of the Barrier, from the Beardmore to Liv's Glaciers, appeared before them. "For the first time in history the entire sweep of this majestic mass which buttresses the polar plateau was visible to human eyes." Byrd continued: "One glacier, larger and more beautiful than the rest, which could be seen almost at the limit of vision, I took to be Beardmore Glacier."

The next event was one of great geographical importance. Amundsen had shown on his map, and had fully described, a range of mountains 150 miles long that extended north-eastward from, and at approximately right angles to, the Queen Maud Range and formed part of the eastern coast of the Barrier. This range was the western boundary of his Carmen Land. Byrd found that neither the range of mountains nor Carmen Land existed in their charted positions. The importance of this discovery will be dealt with later. Amundsen's mountains were not recognized at once; but when they had been identified a perfect landing was made. Dean Smith then nursed the engines while Byrd took observations for position and the others landed the petrol depot.

On taking off again, Byrd wished to fly eastwards for a hundred miles or more, to make a thorough search for Carmen Land, and the Ford was headed in this direction. The Queen Maud Range was seen extending to the south-east as plotted by Amundsen; but there was a smaller range, named by Byrd the Charles V Bob Mountains, stretching eastwards. Byrd wrote: "Again I looked for Carmen Land, but in vain. I could see only the Barrier rolling endlessly to the east. . . . We were now able definitely to extend the known limits of the Barrier at least 100 miles to the east." A leak then being discovered in the petrol tank, a dash had to be made for home. The remaining fuel carried the Ford to

within a hundred miles of Little America where a landing was made on the Barrier and more fuel was taken out in the Fairchild ; but there was a delay of nearly twenty-four hours before the adventure ended at the station. No signs of Carmen Land had been seen during the return flight.

The main object of the aeronautical voyage to the South Pole was to make an aerial survey of the country over which Byrd would travel. This alone was well worth doing ; but the flight could not be begun until Gould had reached the mountains and reported the atmosphere there to be perfectly clear. Unless the meteorological conditions over the mountain passes were favourable the flight would be most hazardous. At noon on Thanksgiving Day, November 28th, 1929, the eagerly anticipated message came and at 3.29 p.m. Bernt Balchen, the veteran Norwegian airman, took off in 30 seconds with a total weight of 14,700 lbs.

"No thoroughbred went into a race more carefully, scrupulously groomed," wrote Byrd, than the big Ford monoplane at the beginning of this flight. Harold June was wireless operator and relief pilot, McKinley was surveyor and Byrd navigator as well as in command. The meridian followed was that of longitude $163^{\circ} 45'$ W., approximately over the sledging trail. An east wind made it necessary to fly 10 degrees east of south to allow for leeway. The height of the monoplane was 1,500 feet when the Queen Maud Range came into view. There was again no sign of the reported land to the east. At 8.15 the Geological Party was passed and the aviators descended to 750 feet for the purpose of dropping a parcel, attached to a parachute. The Ford was then set for the struggle over the mountains.

Bernt Balchen at the wheel, Byrd said, "was in his element. His calm, fine face bespoke his confidence and sureness." He had been merely cruising over the Barrier, but now he opened out to full throttle and the three great engines roared their response. As the monoplane rose to 4,500 feet Byrd went forward in the cabin and joined Balchen for the crucial part of the flight. The lowest pass over the mountains had to be found, with little time in which to make the choice ; and there were unknown factors that might be decisive in clearing, or in failing to clear, the summit ridge. Amundsen's information was that high mountains rose above, and on each side of, the highest pass on the Axel Heiberg route ; but whether there would be space there in which to manœuvre the machine could not be known until the pass was reached. Neither

was it known whether a vicious down draught would be encountered when the monoplane was struggling, near its ceiling, for altitude to clear the ridge. Byrd wisely ascended by another route, over Liv's Glacier, because its pass appeared both lower and wider than the Axel Heiberg pass.

They flew over the fuel depot at a height of 9,000 feet, with enough petrol to reach the Pole and return here, although their progress had already been retarded to some extent by high winds. The engines were pulling splendidly as they rose over Liv's Glacier in which some fearful crevasses could be seen. "At this point," wrote Byrd, "the stream of air pouring down the pass roughened perceptibly, the great wing shivered and teetered as it balanced itself against the changing pressures." The crucial moment had arrived, for while still below a height of 10,000 feet,

there were indications [said Byrd], we were near the service ceiling of the plane. The roughness of the air increased and became so violent that we were forced to swing slightly to the left, in search of calmer air . . . but the down-surfing currents here damped our climb.

The situation rapidly became critical. The monoplane was unable to climb fast enough to clear the summit of the pass, now in full view ahead; and there would be no room to turn between the mountains near the highest point. The great machine could rise no higher than the pass and must be lightened.

A food bag weighing 125 lbs. was dropped through the trap-door in the floor of the cabin and the response of the Ford was immediate; but the risk taken in the event of a forced landing, by sacrificing these supplies, was very great. Balchen, however, was still hard pressed for altitude, though he flew with masterly judgment, and Byrd said: "I realized that unless the plane was further lightened, the final thrust might bring us perilously close to the end of our reserve." At that moment Balchen shouted, "Another bag"; and a second 125 lbs. of precious food was seen to scatter over the glacier. Byrd wrote:

The sacrifice was the saving factor. The plane, literally, rose with a jump; the engines dug in and we soon showed a gain in altitude of from 300 to 400 feet. It was what we wanted. We would clear the pass with about 500 feet to spare. Balchen gave a shout of joy. It was just as well. We could dump no more food. There was nothing left to dump.

At a speed of only 77 nautical miles an hour the monoplane cleared the summit, with mountain walls on each side and the level

plateau extending before the airmen to the Pole. The greatest danger now was passed and their flight over the 300 miles that lay between them and their goal would have been uneventful had not Byrd discovered a new range of mountains to the west, about half-way between them and the Beardmore Glacier.¹ He appears also to have discovered a large glacier far to the east of Amundsen's route to the Pole. The hundred and seventy-first meridian west of Greenwich was chosen for the course over the plateau and the height of the monoplane was then between 10,500 and 11,000 feet. An east wind still kept Byrd 12 degrees off his course, and the ground speed was only 90 miles an hour though the engines were cruising at 100 m.p.h. As the Pole was approached, a ceiling of 11,000 feet was maintained, so the Ford was flying at least 1,000 feet above the surface of the plateau. Byrd then began to take observations of the sun with his sextant, and the results very nearly agreed with dead reckoning. June relieved Balchen at the wheel, and at 1.14 a.m. Greenwich Civil Time the Pole was reached.

For ten minutes Byrd manœuvred round the mathematical position and McKinley took photographs that showed the surface of the plateau—which was all there was to photograph—in the likeness of a frozen sea. The Stars and Stripes were dropped on the Pole and a radio message was sent to little America giving the news of Byrd's arrival at his destination. As ten previous explorers had camped on the spot, there was no additional information to be acquired from the air; but a tribute was paid to Scott and Amundsen, and

in their honour, the flags of their countries were again carried over the Pole. There was nothing now to mark that scene; only a white desolation and solitude disturbed by the sound of our engines. The Pole lay in the centre of a limitless plain. No mountains were visible.

There was therefore not much to tell about it, as the Admiral says: "One gets there, and that is about all there is for the telling. It is the effort to get there that counts."

Byrd intended to return on a more easterly course than that of his outward flight, for the purpose of mapping more new country. Unfortunately, clouds were seen advancing from this direction and the monoplane had to race for the head of the pass

¹ Since the above was written Admiral Byrd has informed the writer that some of the photographs he took on the return from the Pole show new mountains to the west of the Beardmore Glacier.

in the hope of reaching it before it was hidden. A height of between 11,500 and 12,000 feet was now attained through the reduced weight of fuel, and at this level a strong south wind was found that increased the speed to about 125 miles an hour. At 3.30 a.m. the race was won and they were safe; at 3.50 they had cleared a new pass and at 4 a.m. the Barrier was reached. Enough fuel then remained for a short flight towards the reputed position of Carmen Land, so the Ford was again turned eastwards. A beautiful glacier was discovered in this direction and then Byrd wrote: "The flight proved what I already knew to be true. Carmen Land does not exist." They now turned westwards to the fuel depot.

At 4.47 a.m., after a smooth landing, the long flight of about 1,200 miles ended. The tanks were refilled, and at 6 a.m. the monoplane took off for Little America. The last part of the voyage was uneventful and the base was reached at 10 a.m. This flight had been one of the finest ever made and was performed without a hitch, though its difficulties were stupendous and its possible dangers appalling. About 1,700 miles had been flown in 19 hours. Success was due to perfect organization, seconded by executive ability of an exceptional order.

There yet remained the eastward voyage beyond King Edward VII Land—no less important and even more interesting than the polar flight because new country of a remarkable character was discovered. The Ford monoplane took off again, at 10.50 a.m., on December 5th, with fuel for a twelve hours' cruise. Byrd set his course to the north of Scott's Nunatak and found that the Ross Sea was open. By noon the Rockefeller Mountains were abeam and the Matterhorn came in sight with high land around it. Byrd was now on the edge of the unknown. He passed Scott's Nunatak at a height of 5,000 feet and from this altitude could see a distance of nearly a hundred miles. "To the north," he wrote, "the continental ice sheet ended in a most unusual formation of ice tongues, which licked into an outer band of shelf ice." Huge stranded icebergs, excessively crevassed, lay off the coast, and a consolidated pack extended beyond Cape Colbeck. The Alexandra Mountains, wrote Byrd, "were far smaller and less extensive than we had expected." They should be named the Alexandra Hills, to distinguish them from the great Queen Alexandra Range in the Beardmore district.

At 12.40 p.m. Byrd made his most important discovery—a huge

range that he named the Edsel Ford Mountains. They extended from north to south for at least 250 miles, though their length was not known when they were first sighted. From the position of the monoplane at that time the coast receded a little south of east and in order to keep the course the Ford was taken over the ice-strewn water. A low barrier, as seen by Scott in 1902, fringed the coast here and was from 25 to 50 miles wide. The land ended in ice cliffs from 200 to 250 feet high, behind which an undulating ice sheet appeared to the east and south. The new country now being approached was named Marie Byrd Land in honour of the explorer's wife. Forty-five miles of open water and then more pack ice had to be passed over, after which Byrd wrote :

A few minutes after one o'clock, we reached the edge of the shelf ice and soon afterwards were about at the hundred and fiftieth meridian, the eastern boundary of the British claims. We were advancing . . . over an area which had been unseen before, unknown and unclaimed.

As the Edsel Ford Mountains were approached, Byrd thought he could see a plateau behind them, but this was not verified. The course of the monoplane lay northward, parallel to the range, approximately as far as latitude $75^{\circ} 30'$ S., and then a turn to the east was made for a few miles, followed by another turn southward in about longitude 145° W. These mountains appear to be 10,000 feet high and to contain one glacier 15 miles wide ; some of the mountains photographed were 110 miles away. The coastal region between the mountains and the sea is remarkable if not, indeed, mysterious, for it seems to resemble nothing on record. Byrd wrote :

The surface between our line of flight and the mountains was very much disturbed. It advanced towards the mountains from the sea in a series of wave-like ridges, which were cracked and broken by pressure. Dim shapes began to loom up in the south-eastward, suggestive of land.

One of McKinley's photographs of this country shows very clearly the " wave-like ridges " mentioned by Byrd, which resemble enormous furrows in a field, of remarkable regularity and ending in a transverse channel of open water. This might be barrier ice. The lines of demarcation between land and sea, however, are almost completely inundated and submerged by snow, but high land stands up clearly in the background. The scene is one of mystery and is dreary in the extreme. Byrd wrote : " Here was the ice age in its chill flood tide. Here was a continent throttled and

overwhelmed." Several lakes of open water then appeared, some of them 50 miles from the sea. When 200 miles of the Edsel Ford Range had been photographed, in latitude $77^{\circ} 27' S.$ and longitude $149^{\circ} 18' W.$ (approximately), the course was changed to westward, which took the aviators between the Alexandra Hills and the Antarctic Matterhorn. Byrd thus flew completely round the former, which are nunataks and extend south-eastward instead of north-eastward as shown on some maps. The whole range was photographed and found to be mostly covered with snow. Terrible crevasses were seen to the north-east of the Matterhorn; and to the north-west of it, in the direction of Scott's Nunatak, "the surface was high and rolling, suggestive of land." The remainder of the flight was over known country, and a brilliant piece of work ended at 6.20 p.m. after being in the air for $7\frac{1}{2}$ hours.

A discovery of a very different character was made on December 15th when a sounding was taken through the ice of an inlet a hundred yards from Little America. The depth was 267 fathoms on soft mud—a startling disclosure to most people; but Byrd had other matters on his mind at that time and merely wrote: "So Little America has been afloat. However, we have always been convinced of that." On December 20th Dr. Gould reported: "Have completely proved that Carmen Land does not exist."

By the beginning of the year 1930 Byrd had become anxious to leave for home. The ice conditions during this season were very bad, and one of his men was suffering from appendicitis. Had an operation been performed at Little America, the patient could not have been transferred to a tossing ship, and a small party would have been obliged to remain in Antarctica for another year. It was necessary for the sufferer to be removed to a hospital as soon as possible, yet the *City* did not leave Dunedin until January 6th, or more than a month later than the previous season when the Bay of Whales had been reached by the end of December. In the first week of January, 1930, three powerful whalers, the *Kosmos*, the *Southern Princess* and the *C. A. Larsen*, were prowling along the northern edge of the Ross Sea pack ice, picking up whales indeed, but unable to start through for the south.

It was evident by the second week in January that the ice would go out of the west side of the Bay of Whales before the east side on which Little America was situated. A camp was therefore established in a suitable locality and sledging began in readiness for the arrival of the *City*. Little beyond the records of the expe-

dition and its scientific apparatus could be taken away unless the *Bolling* also arrived, and of this there was no prospect.

On January 19th, 1930, the Geological Party returned to the station after sledging 1,500 miles.¹ Dr. Gould was the scientist, as well as the navigator, of the party, and on the outward journey had steered for Liv's Glacier. It was reached on November 30th, after crossing many crevasses near the land, and the next three days were spent in this vicinity. Gould was the first geologist to examine the Queen Maud Range and his discoveries are of the greatest interest and importance. The foothills were found to consist of pre-Cambrian rocks, which in the higher mountains were overlain by the Beacon Sandstone, containing a low grade of coal. A base was fixed at Strom Camp on the western portion of the Axel Heiberg Glacier, and on December 6th this glacier was ascended for 14 miles. The following day specimens of sandstone were secured from Mt. Nansen (15,000 feet) at some risk to the party, which reached a height of 6,500 feet. On December 13th they all set out in an easterly direction, but during the following three days were held up by a blizzard. When a great icefield was reached, on the 18th, Gould turned up into the mountains, and here attained his farthest south in latitude $85^{\circ} 27' S.$ The height was 2,000 feet and the rocks were of pre-Cambrian gneiss, schist and granite without any sandstone cap. Nothing was seen to the east except an icy surface, and 25 miles were marched before snow was reached.

The farthest east, in longitude $147^{\circ} 55' W.$ and latitude $85^{\circ} 25' S.$, was arrived at on December 21st where a record was deposited in a cairn. All land to the east of the hundred and fiftieth meridian west of Greenwich was claimed for the United States and named Marie Byrd Land. The chart shows this new country extending as far eastward as longitude $135^{\circ} W.$ Here the mountains are lower, not exceeding 5,000 feet in height; but the glaciers are so large that three of them, Gould said, should be classed with the Beardmore. The geological specimens collected were only limited by the party's quite adequate transport facilities, and 175 miles of the front ranges of the Queen Maud Mountains were mapped.

We had demonstrated [wrote Gould], that this great fault block mountain system is continued almost due eastward from Axel Heiberg Glacier for more than a hundred miles, we had demonstrated that there is no such highland as

¹ Probably statute miles.

Amundsen thought he saw and called Carmen Land, and furthermore we had helped to push the known limits of the Ross Shelf Ice more than 100 miles east than they had been known to exist.

Amundsen's depot and record at the foot of Mount Betty were found, and the party returned to Strom Camp on December 26th. On the 30th they started for Little America and reached it on January 19th after a very rapid return journey, on the last day of which they travelled 34 miles. Some of the best work of the expedition was carried out by Dr. Gould and his companions.

The largest Antarctic station ever built was gradually demobilized, and everything that could be taken away was transported to the western side of the Bay of Whales. On January 20th the *Bolling* left Dunedin, though ice conditions in the Ross Sea remained unfavourable. Byrd made his last flight on this day in the Ford, to study the Barrier westward of the bay. Discovery Inlet was passed over and its inner portion seen curving to the south, in which direction Byrd then flew for about 150 miles. Some ridges and crevasses were observed in latitude 80° S. and longitude 173° E., and a larger area of disturbed ice was found farther south. From that point a direct line was taken for the station.

On February 6th the *City* took 50 tons of coal from the *Southern Princess* on the northern edge of the pack and then headed south through the ice near the hundred and eightieth meridian. In thirty-seven hours she reached the open sea where a hurricane was encountered that nearly wrecked her. For a whole week the gallant officers and crew struggled to keep the ship afloat, until they were nearly exhausted. They were driven 300 miles off their course and almost foundered with the weight of ice on the vessel. On February 18th, 1930, she reached the Bay of Whales, in fifteen hours everything was aboard and she sailed away with seventy-two men and sixty dogs. The three monoplanes and most of the material were left at Little America in good order. Dr. Coman devoted himself to his invalid, who was carefully transferred to the *City*; but there was some danger of an operation, so he was removed to the *Kosmos* in a basket raised by a winch. As the sea was rough, two dead whales were used as fenders between the vessels. The large factory ship had splendid hospital accommodation, as well as the services of a qualified medical man, and being much faster than the *City* or the *Bolling*, would transfer the patient to a land hospital in the shortest possible time.

The *Bolling* had arrived at the northern edge of the pack on

January 29th, but there was no probability of her passing safely through ; Byrd therefore sent her back to Dunedin for all the coal she could carry. This fuel was mainly for the use of her consort, and she returned to the pack on February 20th, when she and the *Larsen* relieved the overcrowded *City* of all the dogs and many of the wintering party. The *Bolling* made a total of ten single journeys between New Zealand and the Ross Sea pack ice, all rough passages ; most of her crew were volunteers and served without pay.

Admiral Byrd ended his record of the expedition when his ships were in the Southern Ocean, a few days before their arrival at Dunedin. While basing his work on well-tried and accepted principles, he showed a refreshing originality of method, especially in his full utilization of every resource of civilization that could contribute to his end. He went out to Antarctica for information and he got it. Truly he enjoyed the good fortune of every first expedition, whether followed by other ventures or not—the fortunes of Scott in the *Discovery*, of Shackleton in the *Nimrod*, Mawson in the *Aurora*, and Amundsen in the *Fram*. He is to be congratulated on his splendid achievements, not the least of which, with his huge personnel, was the fact of not losing a single life.

CHAPTER XVII

THE ATTAINMENT OF ENDERBY LAND: MAWSON AND RIISER-LARSEN¹

DR. H. R. MILL has told the story of the Messrs. Enderby's contribution to geographical research, including the discoveries made by their famous sailing-master, John Biscoe.² Enderby Land for ninety-nine years was wrapped in mystery and romance. Captain Biscoe, who discovered it on February 28th, 1830, was unable to approach within 25 miles of its shores; but across the pack ice he had sighted mountain peaks towering above the snow, and had named the land in honour of his owners. Several unsuccessful attempts were subsequently made to reach this coast. The locality was heavily glacierized, however; pack ice of great solidity repeatedly repulsed the exploring vessels; and so it happened that the mountains espied by Biscoe were not seen again until the southern summer of 1929-30, when two explorers, on summer cruises and carrying aeroplanes for scouting, reached the region almost simultaneously. Neither of them had a land base or wintering party.

The first of these two ventures was the British, Australian and New Zealand Antarctic Research Expedition which rejoiced in the longest of names.³ Sir Douglas Mawson was invited to lead it and gladly consented, for it held out the prospect of continuing the work so well begun in the *Aurora*. The British Government chartered the *Discovery* from the *Discovery* Committee and made this their contribution to the expedition. The New Zealand Government contributed £2,500 and Mr. Macpherson Robertson, a philanthropist popularly known as "MacRobertson," gave £10,000 (afterwards greatly augmented) for the furtherance of scientific research on the cruise. The ship was of 485 tons register and completely equipped, with echo sounding, deep

¹ The British Official Records are here followed. See especially Sir Douglas Mawson's Report: Australian Government White Paper, No. 80, F. 1937.

² "The Siege of the South Pole," 146-73.

³ Fortunately reducible, as its members point out, to BANZARE.



Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

SIR DOUGLAS MAWSON ON RED DOME LOOKING ACROSS SWAIN'S BAY, KERGUELEN ISLAND

trawling and other modern apparatus. Captain J. K. Davis was again in charge of Mawson's vessel and Second-in-Command of the expedition. During the preparations, Major R. G. Casey represented the British and Australian Governments, and the expedition owed much to his labours.

While the *Discovery* was in London she was visited by H.R.H. the Duchess of York, who wished the expedition success, and the ship sailed from the Thames on August 1st, 1929, calling at Cardiff and St. Vincent. At Capetown, which was reached on October 5th, the ship had her final overhaul and was coaled at the expense of the South African Government. Here also Sir Douglas Mawson and his staff joined the vessel, having travelled from Australia by mail-boat. The total complement was forty and the ship was provisioned for wintering in the ice. There were seven professional scientists on board and four scientific assistants, also two aviators and a wireless operator. Mr. Frank Hurley, the veteran photographer, once more returned to the Antarctic; and five members of the personnel had made one or more previous visits to the southern ice.

The region to be explored was the long uncharted sector of Antarctic coastline that extended for 2,500 miles between Kaiser William II Land and Coats Land, broken only by the elusive Kemp and Enderby Lands, which in 1929 presented the most urgent challenge to explorers.

Capetown was left on October 19th, 1929, the Crozet Islands visited on November 2nd and 3rd and Kerguelen reached on the 12th, where during the nine days when the ship was being coaled the island was examined by the scientists.¹ Five or six days were next spent on Heard Island, which was found to have considerable vegetation in spite of the heaviness of its glacierization; the range of species was more restricted than on Kerguelen; wingless insects abounded among the herbage.

The voyage southwards was continued on December 3rd when Mawson began his oceanographical programme. Icebergs were first met with on the 7th and loose scattered pack was entered next day in latitude $60^{\circ} 30' S.$ and longitude $77^{\circ} 50' E.$ through which the *Discovery* made her way until the 16th, when latitude $65^{\circ} 41\frac{1}{2}' S.$, the farthest south in this locality, was attained. The position was approximately 200 miles north-west of Gaussberg, and from here some progress was made to the west. The pack to the south

¹ See Chart No. 1.

was impenetrable, as it consisted of "large floes with bergs marooned in it, the whole all frozen together. . . . This field may have extended right up to the land . . . which evidently exists not far south."¹

On December 26th, in latitude 67° S. and longitude $72^{\circ} 10'$ E., Mawson was possibly within 30 or 40 miles of land, for a sounding gave only 258 fathoms; granite and acid gneisses predominated in the rock samples from the sea-floor. Difficulties began, however, as soon as new land was approached. The seaplane was ready for a flight on the 27th, when the wind rose, driving the pack all round the ship and making an ascent impossible. Moreover the coal supply was so limited "that no more time could be allocated to further investigation of this area."

The position of the *Discovery* on December 29th, 1929, was latitude $66^{\circ} 10'$ S. and longitude $65^{\circ} 10'$ E. Conditions being favourable, an ascent was made in the seaplane, and new land was seen across a heavy consolidated pack that extended to the southern horizon. Lieutenants Campbell and Douglas flew to a height of 5,000 feet and from here several peaked islands were sighted about 40 miles to the south and beyond them the slopes of an ice coast, apparently continental. The islands were named the Douglas Islands and the mainland honoured the expedition's most generous supporter in receiving the name of MacRobertson Land. Open water was observed at a distance of 25 miles to the south.

From here, Captain Davis writes, "We continued our voyage . . . in a westerly direction, pressing southward whenever an appearance of open water was seen."² The ice forced the ship towards the north-west till January 2nd, 1930, when a splendid run southwards was made and latitude $66^{\circ} 35'$ S. reached on the 4th in longitude $61^{\circ} 17'$ E. The depth here was 552 fathoms. On January 5th Sir Douglas made an ascent in the seaplane to a height of 4,000 feet and again saw MacRobertson Land, at a distance of 30 miles to the south of the ship. The ice-clad slopes of the Continent extended east, west and south to the limits of vision, and above them several rocky ranges appeared. The new land was seen 70 or 80 miles to the west, extending in the direction of Kemp Land, but a heavy pack kept the *Discovery* 20 miles off the coast. This pack was "held in position by numerous bergs which are a feature of this part of the coast."³

¹ From a Memorandum sent by Captain Davis to the writer.

² *Ibid.*

³ *Ibid.*



Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

THE DISCOVERY AT ANCHOR IN OOM BAY OFF CAPE BRUCE, MAC-ROBERTSON LAND,
FEBRUARY 18, 1931

A blizzard rose shortly after midnight and the ship was driven to the north for several days, afterwards making progress westwards ; but it was impossible to head again for the new coast until January 11th, 1930, when the pack was found to have been driven against it by the gale. The following day, however, the first of a series of important discoveries was made. As the ship steamed among the numerous grounded bergs, an ice-cliff coast appeared a few miles to the south. The position of the ship was in latitude $66^{\circ} 3' S.$ and longitude $57^{\circ} 43' E.$, while the depth was only 146 fathoms. In the year 1833 Captain Kemp, who was possibly one of Enderby's skippers, had reported land in latitude $66^{\circ} S.$ and longitude $60^{\circ} E.$ ¹ The *Discovery* sailed over this position, but no doubt some of the land now seen farther south by Sir Douglas Mawson had been sighted by Kemp, and the earlier navigator's name is retained on the map.

To the west of Kemp Land "the Antarctic coastline is much less encumbered with pack ice than is the case to the east" ; and to the west of Kemp Land lay Enderby Land. Here, on January 13th, 1930, Mawson came, nearly 100 years after Biscoe had seen it from afar and, approaching from the east, the first British landing was made in latitude $65^{\circ} 52' S.$ and longitude $53^{\circ} 40' E.$, or about 100 miles east of the position given by Biscoe to his Cape Ann. The continuity of the mainland was proved during the succeeding days. An ice-cliff coast, typically Antarctic and rising in the usual snow-slope to the south, was seen to be fronted by a group of islets that might offer shelter for a ship. Thus a base could probably be established here for extensive land operations. No other harbour is known for a distance of 1,200 miles to the east.

The principal islet is a black rock mass rising to a height of 800 feet and contrasting strongly with the ice-covered mainland from which it is separated by only several hundred yards. This we named Proclamation Island [writes Sir Douglas], for a flagstaff was raised on its summit and formal possession of these Antarctic lands taken for the Crown.

This island is probably always joined to the mainland by ice, except possibly for a month or two in the summer. It "is conical in shape and of a dark appearance without any snow on it ; and at a distance of about 40 miles is clearly visible."² The scientists examined the neighbourhood, collected specimens of the rocks,

¹ "The Siege of the South Pole," 167.

² Captain Davis' Memorandum.

and found, among other interesting features, that glacial erratics existed at the highest points visited. From the summit of Proclamation Island a number of rock exposures were seen rising above the continental ice of the mainland; and as the *Discovery* continued her course to the west, at a short distance from the cliffs, more mountains, as much as 3,000 feet high, came into view. The continental shelf extends under the sea for between 15 and 25 miles from the land and innumerable pelagic birds abound on parts of the coast. A greater range, rising to 6,000 feet, was named the Scott Mountains in honour of Captain R. F. Scott. The continental ice here rose, towards the interior, to a height of about 4,000 feet.

Late on January 14th, 1930, when in longitude 47° E. and latitude $66^{\circ} 22'$ S., Sir Douglas Mawson says that he was surprised to see another ship approaching. This vessel proved to be the *Norvegia*, and her commander, Captain Hj. Riiser-Larsen, came on board the *Discovery*. He informed Sir Douglas that he had already flown to the coast of Enderby Land. At a conference between the explorers Sir Douglas proposed that the Norwegians should keep to the west and the British to the east of longitude 40° E.¹

Riiser-Larsen returned to his ship and on January 15th the *Norvegia*, after a short run east, headed back to the west, while the *Discovery* proceeded westwards to about longitude 45° E. and then returned east to examine Enderby Land more closely. Captain Davis writes :

The *Discovery* steamed west from Proclamation Island through an immense number of grounded bergs. The pack here seldom extended more than 3 miles from the precipitous walls of the coastal ice cliff. . . . Numerous black peaks rising at intervals from the inland ice stand out clearly against the white background. . . . The upper portions are thus seen to rise in peak after peak with varied contours along this coast, one behind the other towards the interior.

Westward of longitude $46^{\circ} 30'$ E. the land appears to be completely snow-covered.²

On January 16th a series of easterly gales arose that eventually drove the *Discovery* 150 miles off her course to the west-south-west where she was hove-to in a high sea. On the 22nd it was possible to work back to the east and a gigantic ice tongue, 150 to 200 feet high, was seen approximately in latitude $66^{\circ} 22'$ S. and longitude

¹ The forty-fifth meridian east was afterwards agreed upon by the British and Norwegian Governments.

² Captain Davis' Memorandum.

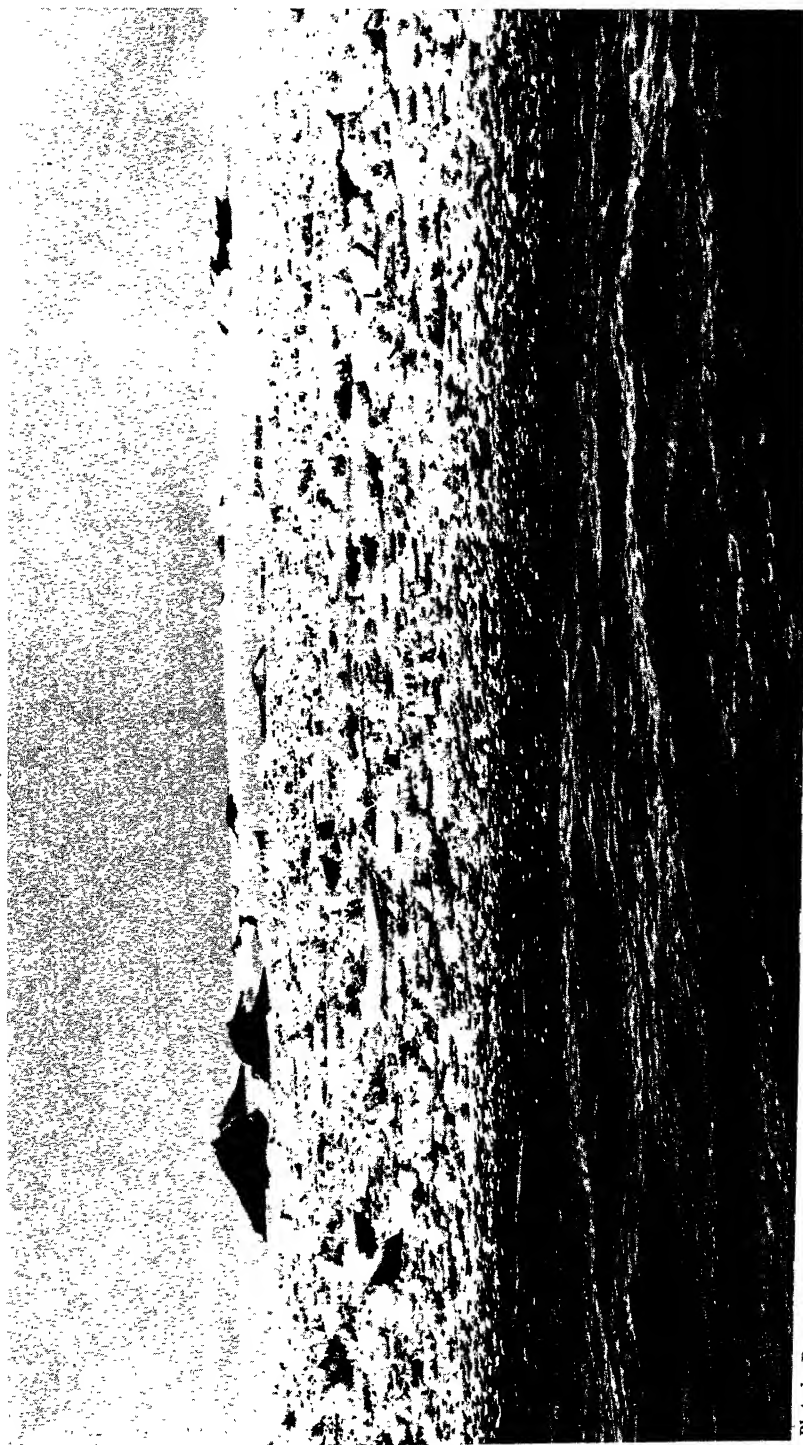


Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

ENDERBY LAND SEEN ACROSS THE PACK ICE

48° 31' E. It extended "apparently from the coast which was observed to slope down to the sea in the form of a great valley. . . . This barrier or ice range holds up the apparent westerly movement of the pack on its east side. . . ." ¹ Proclamation Island was again reached on January 24th and flights were made in the seaplane on the 25th and 26th. From a height of 5,000 feet the plateau of Enderby Land was observed to attain about the same altitude to the south and to contain more than a hundred rocky peaks varying from 5,000 to 7,000 feet high. The ice cliffs on the coast rose from 60 to 150 feet out of the sea. Biscoe, therefore, was correct in reporting "black mountain summits."

All the rocks from the land examined by Sir Douglas Mawson were of a continental character—granites, schists, metamorphic quartzites and slates. As the samples obtained from the sea-floor were also of the same type, there can be no doubt that Enderby Land is part of the same continent that he had previously discovered to the east.

The work of exploration was brought to an untimely end by the shortage of coal and on January 26th a course was set for Kerguelen Island in order to refuel. This island was reached on February 8th and the coaling completed on the 20th. A succession of gales and foul winds delayed the return voyage to Australia, so that Adelaide was not gained until March 31st when the work of the first season came to an end.

In pursuance of Consul Lars Christensen's seasonal programme of Antarctic whaling and exploration, Commander Hj. Riiser-Larsen was appointed, in 1929, to command an expedition in the *Norvegia*, a ship of 285 tons gross. Riiser-Larsen had accompanied Amundsen in his Arctic flights of 1925 and 1926. New whaling grounds were to be sought in the Antarctic and scientific work was to be done, but the main incentive was the hope of discovering new land between Kemp Land and Coats Land, as already planned by Christensen in 1926. Riiser-Larsen was in charge of the scientific researches and had two aeroplanes at his disposal. The *Norvegia* left South Georgia with a total personnel of eighteen and in the early part of November, 1929, reached and charted Bouvet Island. On the 14th of this month the ship set out for the south and on meeting the pack followed its edge eastward until, on December 1st, progress was stopped in latitude 59° 58' S. and

¹ Captain Davis' Memorandum.

longitude $54^{\circ} 26'$ E. Favourable flying weather was taken advantage of on December 7th when Riiser-Larsen ascended in the seaplane in latitude $64^{\circ} 21'$ S. and longitude $53^{\circ} 14'$ E.

The first Norwegian flight in the Antarctic was rewarded with the first view of Enderby Land since Biscoe discovered it, though from a much greater distance; for Riiser-Larsen, on this occasion, was at least 60 nautical miles from the land. Mr. Bjarne Aagaard writes:

As the aviators approached land, they could see that it stretched away from either side of the "knoll," which proved to consist of two large mountains standing side by side, and a third and smaller one. A little further east, a larger group of mountains became visible, and a headland, which Riiser-Larsen named Cape X. East and west of this Cape lay a series of nunataks. . . . The Barrier surface rose up here to the southward, from a wall of sea ice. . . . They were able to discern a coastline extending for at least 100 kilometres [65 miles].¹

Riiser-Larsen was again near the coast of Enderby Land on December 22nd, the *Norvegia* being then in latitude $65^{\circ} 10'$ S. and longitude $49^{\circ} 30'$ E., or 90 nautical miles from Cape Ann. In splendid weather Riiser-Larsen set off due south in one of his aeroplanes, and the following excerpts are culled from a translation of his diary:

As we approached land, the nunataks emerged . . . and it appeared that what I had taken for Cape Ann was a rocky ridge standing up from the barrier surface, far inland. There was a long distance between the ridge and the edge of the barrier where it joined the sea ice. . . . We flew inland for a little way, over the barrier, but it rose up at a more sudden gradient than we could ascend. We therefore followed a somewhat oblique course inland, and finally swung southwards down the coast. . . . At 12.28 p.m. we landed in a lead . . . stopped the engine and discussed the situation. . . . Looking south, we descried a couple of barren islets close by the barrier.

The Norwegian flag was hoisted on the larger of "two ice-sheathed reefs standing out from the sea ice not far from the land." The explorers were fortunate in returning safely to their ship, for a fog came on.²

The *Norvegia* then left the Antarctic coast to meet the *Thorshammer* from which she was coaled at sea on January 4th to 6th,

¹ "Fangst og Forskning," Chap. XIV, *passim*.

² *Ibid.*, Chap. XVI. See also "Geog. Rev.," Oct., 1930, 563, where Riiser-Larsen uses the term "snow-covered skerries" and his photograph (p. 564) appears to show ice pressure-ridges.

1930. Here Riiser-Larsen received information that, as Great Britain claimed Enderby Land and Coats Land, the Norwegian Government requested him not to occupy any new territory except between the meridians of 45° E. and 15° W. Soon after returning to the ice, on January 14th, the *Discovery* was sighted in latitude $66^{\circ} 28'$ S. and longitude $47^{\circ} 7'$ E. Riiser-Larsen wrote:

We dipped our flag, to which she responded. . . . Meanwhile both ships had stopped . . . and hailing them I said I would very much like to come on board and see Sir Douglas Mawson, which I was most cordially invited to do. . . . Captain Davis and Sir D. Mawson received me on the gangway and invited me into the cabin. I came at once to the point and explained . . . what we had done up to the present, and that we intended to take up work again where we stopped it on December 22nd, i.e. follow the pack westwards from Enderby Land to the Weddell Sea, taking oceanographical stations and making flights whenever the chance occurred. After having been shown round the ship . . . I returned in about an hour's time.¹

The explorers had a frank and friendly conference before parting.

On January 15th Riiser-Larsen made an interesting flight from about longitude $49^{\circ} 30'$ E., to the west of his previous aerial reconnaissance, and discovered new country to the south-west of Enderby Land; this he named Queen Maud Land. The *Norvegia* then steamed westward to longitude 44° E. and another flight enabled Riiser-Larsen to continue his charting of Queen Maud Land to longitude 43° E.

Oceanographical work was carried out during the next month, until on February 16th, 1930, the *Norvegia* approached the Weddell Sea. The following day, in latitude $70^{\circ} 42'$ S. and longitude 13° W., a long row of stranded bergs was seen to the south, in which direction the ship proceeded, sounding as she went and finding the water rapidly shoaling. On February 18th ice cliffs were seen and approached to within 500 feet, the pack proving no obstruction to the movement of the vessel which stopped in a large bay that was named Seal Bay from the abundance of these animals found there. The seaplane was launched and the new land followed to the south and east of the *Norvegia* until fog terminated the flight after 60 miles of the coast had been delineated. Next day the ship was moved some miles to the west till held up by the pack; but on the 20th a second flight was made, this time to a height of 5,000 feet, on a south-east course. Coats Land was then

¹ "Fangst og Forskning," Chap. XVI.

seen to the south-west and a further 150 miles of coastline added to the new land—named Crown Princess Martha Land. No mountains or nunataks appeared to break the dull monotony of the snow slopes; the new country was as featureless as Coats Land. Gales and unfavourable ice conditions prevented the *Norvegia* from leaving Seal Bay until February 23rd, 1930, when Riiser-Larsen was glad to escape northwards. The *Thorshammer* was again met at sea, on March 2nd, and coaling successfully carried out, after which the *Norvegia* proceeded to Capetown where she was laid up for the winter. New whaling grounds had been found and much new land discovered.

During the last or 1930-1 season of our period the *Norvegia*, under Captain Gunnar Isachsen, made a complete circumnavigation of Antarctica, leaving Capetown on October 4th, 1930, and being coaled at sea from time to time by floating factories. The only important discovery was made at the end of the season when, on February 16th and 17th, 1931, Captain Riiser-Larsen, who had then taken over the ship, extended his reconnaissances of Queen Maud Land 200 miles farther to the west. Full details of these discoveries are not available at the time of writing, but the new land lies between longitude $24^{\circ} 15' \text{ E.}$ in latitude $70^{\circ} 30' \text{ S.}$ and longitude $33^{\circ} 30' \text{ E.}$ in latitude $68^{\circ} 40' \text{ S.}$ and was named Princess Ragnhild Land. The Norwegian whaler *Torlyn*, under Captain K. Mikkelsen, appears to have confirmed Sir Douglas Mawson's discovery of MacRobertson Land the previous year. An ice barrier was seen in latitude $68^{\circ} 50' \text{ S.}$ and longitude $70^{\circ} 28' \text{ E.}$ on February 13th, 1931, and approached to within a short distance. On the 14th the ship proceeded along the coast to the west and found a large bay beyond which, between longitudes $66^{\circ} 30' \text{ S.}$ and 65° E. , mountains in several places were seen "extending down to the sea, projecting above the inland ice."¹

The second cruise of the *Discovery* on the British, Australian, New Zealand Antarctic Research Expedition began on November 22nd, 1930, when the ship sailed from Hobart, Tasmania. Captain J. K. Davis had returned to his duties as Director of Navigation to the Commonwealth Government and his place was taken by Captain K. N. Mackenzie, who had been First Officer on the previous trip. W. R. Colbeck, son of Captain W. Colbeck of the *Southern Cross* and *Morning*, was Navigating Officer, and Sir Dou-

¹ "Geog. Journ.," Nov., 1931, 413.



Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION]

THE *DISCOVERY* IN COMMONWEALTH BAY

glas Mawson, accompanied by a scientific staff, again commanded the expedition. The *Discovery* was fully provisioned for a winter in the ice, should the necessity arise, and carried 450 tons of coal.

A call was made at Macquarie Island, to the south of which oceanographical work was carried out, and the pack entered on December 10th in latitude 62° S. Commonwealth Bay in Adelie Land was revisited and a landing made at Mawson's previous base, Cape Denison, where his old hut was found to have withstood the blizzards of seventeen years and the stores to be still in good condition. All the land eastwards to Oates Land, between longitudes 142° and 160° E., was claimed for the British Crown under the name of King George V Land. After putting to sea again, 50 tons of coal were taken, on December 29th, from the pelagic whaling factory *Kosmos* of 22,000 tons, two dead whales acting as efficient fenders between the ships.

The seaplane enabled the coast to the west of Cape Denison to be followed almost without a break. Additions were made to the survey of Adelie Land; the charting of Wilkes Land was extended; and several new coasts were discovered. The first of these, extending westwards from the hundred and twenty-seventh meridian east in latitude 66° S., was named Banzare Land in honour of the expedition. Balleny's name, Sabrina Land, was adopted for another new country that lay between the hundred and fifteenth and hundred and sixteenth meridians east. On January 27th, 1931, Mawson flew to a height of 5,700 feet and saw the great plateau extending, as elsewhere, east and west. There was no land in the position assigned by Wilkes to his Budds Land.

Hitherto the ice conditions had not been favourable; but as the *Discovery* proceeded westward she was able to sail in uncharted waters to the south of any previous ship in this locality. A huge group of grounded icebergs was found to extend for 100 miles to the east of the Shackleton Shelf and among them a new ice-covered island was discovered in latitude 65° S. and longitude 103° E. This island was named Bowman Island; it was 11 miles in diameter and over 1,000 feet high. Since the last visit of the *Aurora* there had been great changes in the ice phenomena farther west and Termination Tongue had disappeared.

Other interesting discoveries were soon to follow, the first of which was a new country beyond Gaussberg, named Princess Elizabeth Land and situated between longitude 80° E. and Mac-Robertson Land. Its coast presented some miles of impressive

rock exposures. On February 9th to 11th MacRobertson Land was approached and in longitude $69^{\circ} 20'$ E. the coast was found to bend southwards, forming a large opening that was named Mackenzie Sea, with open water as far south, approximately, as latitude $68^{\circ} 30'$ S. The continental ice of the mainland rose to a height of 4,000 feet in the south, and barrier ice fringed the coast.

The *Discovery* continued westwards until, between longitudes 61° and 62° E., more masses of exposed rock, 2,000 feet high, were seen. This part of MacRobertson Land was reached in the motor boat and a record deposited in a cairn. Other landings were also made in several places, notably on the Scullin Monolith, and the coast of this land, discovered during the previous season, was carefully charted until February 19th, when shortage of coal again compelled Mawson to leave for home. Large rookeries of petrels and penguins had been found.

The cruise had been most successful. New coasts extending over 16 degrees of longitude in total length had been discovered, besides the more detailed charting of many miles of the 13 degrees of new land discovered the previous year. On the two cruises approximately a thousand miles of new coast had been charted. On his two expeditions of 1911-14 and 1929-31 Mawson proved that the coastline is continuous from Cape Freshfield in King George V Land to Enderby Land, a distance of over 2,500 miles—a great and outstanding achievement.

In future years, if human reason be supreme, adventures will occupy a more modest place in our esteem than the sober pursuit of truth; and thus the work of such explorers as Sir Douglas Mawson will be seen in a better perspective than at present. Our knowledge of the ice-cliff coasts that encircle the greater part of Antarctica is mainly due to him. Biscoe first saw an ice coast from afar; Bruce charted one for 150 miles and Drygalski reached another; but Mawson was the first explorer to establish a station, at Cape Denison, on these coasts, and no other base has yet been set up either on them or in any other comparable locality, except Mawson's own Western Base. Cape Adare is more completely cut off from the continent than if it were on an island, and it is on a mountain coast. The three Ross Island stations lie off the same, exceptional, mountain type of coast as Cape Adare; and though probably nearer to the continent, they resemble the Bay of Whales' stations in being separated from it by barrier or sea ice. The conditions at these various stations are radically different from the



Photo by BRITISH, AUSTRALIAN AND NEW ZEALAND ANTARCTIC RESEARCH EXPEDITION!

PART OF THE SCULLIN MONOLITH, MAC-ROBERTSON LAND

conditions found, probably, on three-quarters of the whole continental seaboard.

Mawson served his Antarctic articles early in the Heroic Era and carried to success his first expedition before the European War; yet he may still be said to be in the field of operations, having only returned from his last expedition a few months before these lines are written. His experience covers the whole of our period and embraces both its heroic and mechanical phases; for he made an epic journey to the Magnetic Pole and afterwards adopted the technical aids to exploration, especially flying and wireless telephony, the latter of which he introduced into Antarctica. He discovered the D'Urville Sea, King George V Land, Banzare Land, MacRobertson Land and Princess Elizabeth Land; he was the first explorer to land upon, chart and examine Adelie Land; he also re-discovered Kemp and Enderby Lands. All this and much more he did in person; while his Second-in-Command, Captain John King Davis, discovered Wilkes Land, the Davis Sea, the Shackleton Shelf and Queen Mary Land, the coast of which Commander Wild, as Mawson's deputy, explored. Estimating thus the results of Sir Douglas Mawson's four to five years' work, as they should be estimated, on the basis of the positive increase in geographical and other knowledge, he is seen to have been the most successful Antarctic explorer in the period.

SCHEDULE No. 8

1912, THE *ANNUS MIRABILIS* OF ANTARCTIC EXPLORATION

1911. Dec. 14-17. Amundsen at the South Pole.
1912. Jan. 4. Scott's Last Supporting Party under Lieutenant Evans turned back in latitude $87^{\circ} 34'$ S.
- " 6. Mawson reached Adelie Land and discovered King George V Land.
- " 8. The *Terra Nova* left Scott's Northern Party at Evans Coves.
- " 15. The *Kainan Maru* entered the Bay of Whales.
- " 16. Scott reached the South Pole.
- " 24. Davis discovered Wilkes Land.
- " 25. Amundsen reached Framheim on his return from the Pole.
- " 30. Filchner discovered Luitpold Land and the Filchner (formerly Wilhelm) Barrier.
- Feb. 8. Davis discovered the Shackleton Shelf.
- " 13. Davis and Wild discovered Queen Mary Land.
- " 14. Scott's Geological Party picked up by the *Terra Nova*.
- " 18. Filchner's station in Vahsel Bay broke adrift.
- " 20. Crean reached Hut Point and Atkinson rescued Lieutenant Evans.
- March 7. The *Fram* arrived at Hobart and transhipped twenty-one dogs to the *Aurora*.
- " 15. The *Deutschland* beset in the Weddell Sea.
- " 29. Scott wrote his last words. Wild held up by blizzard in Queen Mary Land.
- May 20. The *Aurora* started her first Oceanographical Cruise.

WINTERING PARTIES ¹

Filchner's 33 men in the *Deutschland*,
 Mawson's 18 men at Cape Denison,
 Scott's 13 men at Cape Evans,
 Wild's 8 men on the Shackleton Shelf,
 Campbell's 6 men in Terra Nova Bay.

- Aug. 17. The *Aurora* ended her first Oceanographical Cruise.
- Sept. 30. Scott's Northern Party left Terra Nova Bay.
- Oct. 30. Wild started on his main journey.
- Nov. 7. Jones set out for Gaussberg.
- " 8. Mawson began his exploration of King George V Land.
- " 11. Scott's last camp found by search-party.
- " 26. The *Deutschland* began steaming out of the Weddell Sea Pack.
- Dec. 14. Death of Ninnis in King George V Land.
- " 21. Mawson's Party under Bage reached Magnetic Pole.
1913. Jan. 6. Wild returned to Mawson's Western Base.
- " 7. Death of Mertz in King George V Land.
- " 21. Jones regained Western Base from Gaussberg.
- " 26. The *Terra Nova* left Antarctica.
- Feb. 8. Mawson returned to Cape Denison.
- " 23. Davis relieved Wild's Party.

¹ In the sub-Antarctic Zone there was also Mawson's station on Macquarie Island.

CHAPTER XVIII

A SURVEY OF THE PERIOD 1906-31

THE hiatus in peaceful pursuits caused by the European War divided this period of Antarctic exploration into two parts, the dominant features of which may perhaps be termed Homeric and Mechanic. The earlier stage included the years when Antarctica was under the most intensive observation in its history, though in 1928-31 an almost equal activity prevailed. The pre-War stage culminated in 1912, the *Annus Mirabilis* of Antarctic exploration, as 1812 had been "that critical moment in the history of mankind" when the power of Napoleon was broken. In 1912 Scott reached the South Pole on his fatal last journey; his Northern Party was in Terra Nova Bay and the Geological Party at Granite Harbour. Mawson established the first scientific station on the ice coasts of the mainland and made his tragic journey across King George V Land. Wild built his hut on the Shackleton Shelf and explored Queen Mary Land. Filchner entered the Weddell Sea and Shirase the Bay of Whales, while Amundsen returned from the South Pole. Shackleton, at this time, was chafing at home, like Achilles in his tents, until he decided to embark on his second or *Endurance* Expedition which overlapped the first two years of the War and ended the heroic age of Antarctic exploration.

Far too much interest was absorbed in merely attaining a high latitude until the South Pole had been reached, and it became virtually a race for a point of no importance. Unfortunately this emulation also caused a certain amount of bad feeling among the partisans of the expeditions. This was unworthy of serious exploration, which should be scientific; and the principles of science are impersonal and disinterested. Scientific work was indeed carried out during these years, but polar exploration could never become ideal until popular interest in the attainment of the Poles had been eliminated.

A great impetus was given to all mechanical and electrical arts and crafts by the War; hence in the second or post-War stage of the period there was a decided increase in the application of technical appliances to geographical research in Antarctica. The most

striking development had been in applied, rather than in pure, science, though the latter has seldom been neglected. Scientific methods for the advancement of exploration had been introduced before the War, but neither flying nor wireless telephony were sufficiently developed for effective use in the Polar Regions until after 1918; and these two modern inventions have played the most important part in recent expeditions.

Flying has revolutionized the preliminary charting of new countries; otherwise it is less advantageous than popularly supposed. The main advance of science must still be made on and beneath the surface of the earth and sea, but more land can now be discovered and photographed in ten minutes than was formerly possible in a day. Aeroplanes are the eyes of explorers, for an area of 50,000 square miles can be seen from a height of 10,000 feet against 75 square miles on foot. Dog sledging, however, is not yet superseded, though its use may now be restricted to scientific journeys and the transport of goods. Flying enables places to be reached that are otherwise inaccessible, as Mawson and Riiser-Larsen showed in the Enderby district. Or again, some land, such as the high plateau of Graham Land, is not easily attainable except from the air. Aerial surveying may need to be checked on the ground before its results can be finally fixed.

The heroic deeds performed on the earlier expeditions were partly due to undeveloped methods, and adventures often show that something is wrong. To discuss the relative heroism of flying over polar lands and sledging across them is beyond our scope; but probably there are few, if any, who will refuse to acclaim aerial explorers as heroes.

The southern season of 1929-30 was another marvellous year in the annals of Antarctic exploration comparable, though not equal, to 1912. In 1929 there was only one less expedition in the field than there had been seventeen years earlier, but two of the later expeditions were merely summer cruises. The later subsidiary parties also were few, and not important independent commands like Scott's Northern Party and Mawson's Western Base. In 1929-30 Byrd made several flights over the Ross Barrier and one to the South Pole, in addition to several eastern flights on which he made important discoveries. Meanwhile, Gould's Geological Party was working in the Queen Maud and Charles V Bob Mountains. Wilkins made five flights, one of them on the day, January 5th, 1930, when Mawson, for the second time, sighted

MacRobertson Land from his aeroplane, and the *Norvegia* was being coaled at sea after Riiser-Larsen had reached Enderby Land. One week later, on January 13th, Mawson reached Enderby Land, and on the 15th Riiser-Larsen discovered Queen Maud Land. On January 20th Byrd made his last flight over the Ross Barrier and on February 1st Wilkins flew to latitude 73° S. in longitude $100^{\circ} 45'$ W.

A glance at the Key-charts on the next page will show the immense geographical discoveries made in Antarctica during the twenty-five years that have come under our consideration. Proceeding westwards from Cape North, the mountain coast of South Victoria Land has been charted intermittently for short distances, beyond which the ice-cliff coasts have been found to extend nearly all round the continent. These ice coasts, interspersed with diminishing stretches of uncharted coastline, have been traced for thousands of miles, through King George V, Adelie, Wilkes, Banzare and Queen Mary Lands, followed by Princess Elizabeth, MacRobertson, Kemp, Enderby, Queen Maud, Crown Princess Martha, Coats and Luitpold Lands, or three-quarters of the whole continental coastline. Hearst Land also, in all probability, should be included in this category. Graham Land is mountainous but not continental, except in the oceanographical sense. The ice coasts at present vanish into the unknown to the west of Charcot Land.

Viewing Antarctica thus as a whole, apart from the large island of Graham Land, two distinct types of coast appear:

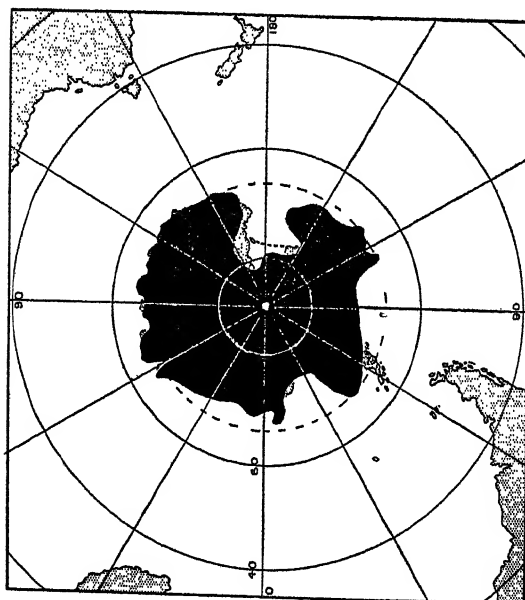
TYPE I. The beautiful mountain coast of South Victoria Land which was the first to be explored and is known to extend from Oates Land to the Charles V Bob Mountains. It is thus restricted to the Ross Dependency. Its mountain chain is only broken by transverse glaciers.

TYPE II. The stern ice coasts. These are at least four times as extensive as Type I, though only charted, at present, for about double the length of the mountain coast. There are some mountains and other noble rock exposures on these coasts, but they are dwarfed, for the most part, when not submerged, by the ice.

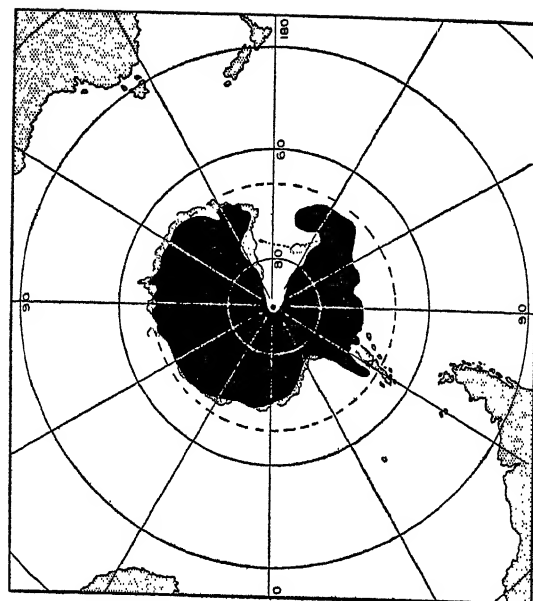
Our state of knowledge at the present time (April, 1932) is insufficient to classify the coast of King Edward VII Land with its extension eastwards to Marie Byrd Land. It would seem to

KEY MAPS

2



ANTARCTICA IN 1906



ANTARCTICA IN 1931

THE UNEXPLORED IN BLACK

resemble a heavily glacierized archipelago. The last word on this district has been spoken by Admiral Byrd who says that his new map shows a great change in the coast, or barrier, to the east of Biscoe Bay.

Where some of the maps [he writes] show the Alexandra Mountains, there is actually open water in the summer time, and the edge of the continental shelf really extends to the south-eastward from approximately latitude 77° longitude 152° and forms a tremendous bay, the depth of which we cannot be certain of, but which we know runs at least 50 miles to the south-east and the width of the bay here at its mouth is at least 50 miles.¹

The mountain coast which has been chiefly explored extends approximately for one-quarter or one-fifth part of the whole continental seaboard, and it is unfortunate that more work has not been done on the predominant ice coasts. There may be great surprises when further results come in from them; more continental stations on them are needed.

The most interesting geographical problem, around which the greater part of the research hitherto has revolved, was and still is the Ross Barrier. About three years before our period began, Scott, Shackleton and Wilson had made the first important exploration of its surface and discovered more than 300 miles of its western coast. This discovery proved a great incentive to further pioneering, for it seemed to intensify what was then spoken of as the "Barrier Mystery"—a mystery that played no small part in drawing Shackleton back to that region in 1907. His discovery of several hundred more miles of coastline and mountain ranges south of the Barrier left a firm basis on which Amundsen built. The latter in turn extended Shackleton's coast south-eastward of Mt. Hope for several hundred miles in the Queen Maud Range, which Byrd has recently seen in all its grandeur; but Amundsen also thought he had discovered another country that he named Carmen Land. This new territory, as shown on his map, formed part of the eastern side of the Barrier, previously unknown. In addition to this, he charted an "appearance of land" in about latitude $81^{\circ} 30' S.$; he had no doubt that this was land for he had no hesitation in calling this also a part of Carmen Land.² Thus he indicated, and in part delineated, an eastern side of the Barrier which almost completely removed its mystery by making it a large bay in the Ross Sea.

¹ From a memorandum sent to the author in March, 1932.

² "The South Pole," II, 171. See also *Ibid.*, II, 31, 32, 45.

Admiral Byrd and Dr. Gould now appear to have proved that Carmen Land does not exist in its charted position; that the "appearance of land" is no more than a large area of disturbed ice; and that a new mountain range, named the Charles V Bob Mountains, extends for more than 100 miles beyond the Axel Heiberg Glacier in the same direction as the old coastline from the embouchure of the Beardmore Glacier. Thus, the southern coastline of the Ross Barrier stretches indefinitely, as far as it has been seen, on approximately the line originally laid down by Shackleton, and the eastern boundary of the Barrier as indicated by Amundsen does not exist. It may possibly have been the Charles V Bob Mountains that Amundsen saw.

In this sense, therefore, that the Barrier Mystery has taken a new form instead of being entirely removed, Byrd's expedition, brilliant as its results were, has asked more geographical questions than it has answered. Is the Barrier a bay or an enormous frozen strait to the east and north-east? If entirely enclosed by land, where does its eastern boundary lie? If the Barrier is not a large bay, what is it?

Byrd's opening up of its eastern side has also opened up an important geographical problem that was thought to have been closed by Amundsen. The interest of Antarctic geographers is now directed upon the uncharted region that lies between Dr. Gould's farthest east and Sir Hubert Wilkins' Hearst Land, more than 1,000 miles to the north-east. Marie Byrd Land may not be connected with this major problem but may have a separate problem of its own. Admiral Byrd believes that the Barrier stretches from the Charles V Bob Mountains to the Edsel Ford Range—a suggestion that raises other considerations.

The whole region that includes King Edward VII Land, Scott Land and Marie Byrd Land needs much more detailed examination than is possible from the air. As these lands have not been fully delineated it is not known whether they are insular or continental. Byrd believed he could see a plateau to the east of the Edsel Ford Mountains, but he was not able to make this evidence fully conclusive. Unfortunately there is always some limit to every voyage of discovery and we are left with no more than a probability that he had sighted the continental coastline.

If we rapidly summarize the geographical gains of the period we shall notice that Shackleton, Amundsen and Byrd greatly

extended the earlier discoveries of Ross, Borchgrevink and Scott in the Ross Dependency. Charcot, Wilkins and the whalers carried on the good work of their predecessors in the Graham Land District and to the south-west thereof. Mawson, Davis, Wild, Filchner and Riiser-Larsen have made some of the most important discoveries in breaking through the pack to entirely new land beyond it, as Ross did a hundred years ago. Mawson and Riiser-Larsen have discovered the largest amount of continental coastline. Among the other pioneers, all of whom must have full credit for breaking completely fresh ground, Shackleton and Filchner in the Weddell Sea are fine examples.

Only five journeys have been made towards the interior of Antarctica and none of them, during the last twenty-five years, has penetrated very far. They were undertaken by Shackleton, David, Amundsen, Scott, and Bage of Mawson's first expedition. To these must be added Byrd's flight to the South Pole. Charcot, Filchner, Davis, Wild, Shackleton and Mawson on their second expeditions, Wilkins and Riiser-Larsen, restricted their activities to coastal surveys; and the greater part of Mawson's first and Byrd's expeditions were the same. The preponderance of effort, therefore, has been where, to begin with, it was most needed. For the last seventeen years no exploration of any part of the interior has been attempted, though during this time many expeditions have reached the shores of Antarctica. Lieutenant Bage blazed the last inland trail, and the distance he went from the coast was nearly as far as the South Pole from the Ross Barrier. Byrd followed the Norwegian route to the Pole, and the new mountains discovered by the Americans were on the coast of the Barrier. Byrd's other discoveries were also in a coastal district and Wilkins turned back, on his flights, from the edge of the continent. No journey has yet been made to explore the central part of the plateau.

Sir Hubert Wilkins showed that Graham Land consisted of one or more islands. His Hearst Land appears to be difficult, if not impossible, to reach by water. Yet one of the four major geographical requirements in Antarctica now is to link up this new country with Luitpold Land on the east and with King Edward VII Land on the west. This consideration leads to the second requirement: that of completely charting the whole district comprising King Edward VII Land, Scott Land and Marie Byrd Land.¹ Again this leads to the third problem: the final delineation of the

¹ This is written before Admiral Byrd's charts are published.

eastern and southern borders of the Ross Barrier. The foregoing problems are related, but it would be too much to expect the solution of them all by one expedition. There still remain more than 2,000 miles of unknown ice coast to be charted; but if aeroplanes are used, this should present no insuperable difficulty.

Geographical discovery is fundamental to the progress of the human race because the function of the geographer is to know the world as a whole and to study the inter-relationship of all its parts. Sir Charles Close, President of the Royal Geographical Society, said on January 23rd, 1930: "The very foundation of all our work is the exploration of the world's surface and the expression of the result of this exploration in maps."¹ As long, therefore, as land is uncharted man's first work remains undone; and the credit of pioneering is to be judged by the extent and accuracy of its maps. When the whole of Antarctica has been charted the time will have fully come for intensive scientific research, though much of this can be carried out concurrently with the surveying.

For the government of any country to be regarded as truly enlightened it should encourage and support the advancement of knowledge and hence geographical research. The business of obtaining complete information regarding the earth, its character and resources, is of international importance. In recent years the trend of politics, almost wholly engrossed in sordid matters, holds out little hope for the encouragement of the higher progress of mankind. An enlightened government department, however, may do much, as seen in the work of the *Discovery* Committee under the British Colonial Office; and relatively small government grants have been made to other expeditions. Thus there seems no reason why at least one more research expedition should not be sent out in the near future for the purpose of still further reducing unknown Antarctica, though many such expeditions will be necessary before the whole of the great Southern Continent has become known.

¹ "Geog. Journ.," Aug., 1930.

APPENDIX I

SOME NOTES ON NEW AUTHORITIES AND SHORT LIST OF BOOKS REFERRED TO

THE ultimate authority in all records of geographical exploration is the written or spoken word of explorers; and these original sources of information, on the period covered by this book, may be regarded as complete. Our authorities may be grouped as follows:

1. Original diaries, letters and memoranda of explorers.
2. Verbal statements of the same.
3. Published works of same.
4. Other data, as specified a few lines below.

Some remarks seem to be needed on the new authorities.

Most of the diaries used in this book are very full records of events, and the best of them are worthy of being published *verbatim*. One result of this is that the history of these expeditions is well known. Living explorers have been most willing to correspond on the subject of their expeditions and have done so to a large extent. In this manner they have sent a great deal of valuable, and otherwise unobtainable, information additional to that from other sources. The correspondence with explorers, critics and historians has proved one of the most important branches of the work and one that has made it not only authoritative but intimate.

The writer has met most of the living Antarctic explorers and the members of their staffs. As much time as possible has been spent with them and it is impossible to say how much original data has been gleaned from their lips. Their published works call for no comment. The *Other Data* consist largely in the reports of lectures, articles in geographical and other journals, various original documents that have been transcribed and printed so as to be accessible to students, also books of many kinds; but above all, the numerous scientific reports issued by most of the expeditions. All or nearly all the above are to be found in the library of the Royal Geographical Society or at the Scott Polar Research Institute in Cambridge. No bibliography is given here because Mr. Bjarne Aagaard published one in 1930 much more comprehensive than we have space for. See his "Fangst og Forskning i Sydishavet," pages 957-1032, with a further thirty pages of whaling literature.

Two new sources of information utilized in Chapter II have been Shackleton's original letter to his wife sent by the *Nimrod* from Cape

Royds and of great length; also Frank Wild's original diary, kept on the polar journey of 1908-9, and of interest in more ways than one. It nearly went down in the *Endurance* and was rescued the second day after the abandonment of the ship, as recorded by Mr. Wordie in his "Weddell Sea Log." Shackleton's original *Nimrod* diary has also been perused. There have been letters, memoranda and conversations with Sir Douglas Mawson and Captain J. K. Davis regarding Chapters IX and X.

With reference to Chapters XI and XII there have been the original diaries of Sir Ernest Shackleton (November 1st, 1915, to April, 1916) and Commander Frank Worsley for the whole expedition; also typescript copies of diaries for the whole expedition of Mr. J. M. Wordie and Mr. R. W. James. These diaries and Commander Worsley's "Log of the *James Caird*" make Chapter XI the richest in new material. There have been letters from Captain H. K. Salvesen, from Sir Hubert Wilkins; letters and memoranda from Admiral Byrd, with a large amount of new data, and the same remark applies to Chapter XVIII with Sir Douglas Mawson, Captain Davis, and Mr. Aagaard for Captain Riiser-Larsen.

There are three methods by which to utilize authorities: 1. By quoting *verbatim*; 2. By using as prime sources of information; 3. By a combination of these methods. All serious students will desire the publication of as much as possible of the original diaries, letters, memoranda, etc.; but in order to condense the record of a twenty-five years' period into a single volume it is necessary to restrict the use of explorers' *ipsissima verba* much more than may be desirable. A long passage can be summarized in one or two sentences, though its effect may thereby be spoilt. The value of an eye-witness account is so great that the diaries have been quoted at considerable length. Merely to quarry from them for the facts is to describe a picture or a sunset instead of seeing them; and the original documents alone are authoritative. The third method, of necessity, has been adopted.

Short List of Authorities to which acknowledgments are made:

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APPENDIX II

THWARTED EFFORTS

1. *The Japanese Expedition, 1910-12: Shirase in the Kainan Maru.*¹

The growing national consciousness of Japan found expression in 1909 in a desire to obtain the honour of first reaching the South Pole. The original programme, announced by Lieutenant Shirase, who had had previous Arctic experience, was based entirely upon Shackleton's achievements. There were to be fifteen men, ten of whom would be landed with ten Manchurian ponies in McMurdo Sound. Five of these were to march to the Pole while the others laid depots for their return. The ship, the *Kainan Maru* of 200 tons, left Japan on November 29th, 1910, and Wellington, New Zealand, on February 11th, 1911, but the expedition did not succeed in reaching the Ross Sea and returned to Japan in May without having accomplished anything.

It set out again the following season and with better fortune sailed into the Bay of Whales on January 15th, 1912, the day before Captain Scott reached the South Pole. The *Fram* had been back in the bay for a week, awaiting Amundsen's return from the Pole, and the *Kainan Maru* was moored to the Barrier edge at no great distance away. Ten men with picks and shovels at once went ashore, while others proceeded to slaughter penguins and seals. Some of the Norwegians visited the ship, but naturally found conversation difficult. They were impressed by the cruelty of the Japanese to the animals they encountered.

Next day the commander of the *Kainan Maru*, Homura, visited the *Fram* and a tent was erected on the Barrier, occupied by four men. The ship departed on an attempt to effect a landing on King Edward VII Land. Meanwhile, two of the party set off on a sledge journey across the Barrier in a south-easterly direction, partly for the purpose of making meteorological observations. They reached a point 150 miles distant, in latitude 80° 05' S. and longitude 156° 27' W., where the ice was as much as a thousand feet above sea

¹ "A travers le monde." "The South Pole," I, 41; II, 184, 271, 272, 347. "Geog. Journ.," XL, 220.

level, and they were confident that rocks, though invisible at the surface, must be present beneath. This was their main achievement and it may be supported by the discoveries of Admiral Byrd. No account of their work as a whole appears to have been published in any European language and scarcely any scientific researches were attempted.

2. *The British Imperial Expedition, 1920-2.*¹

There were originally four members of this expedition: Mr. J. L. Cope, leader, formerly with the Ross Sea Party of Shackleton's 1914-16 Expedition; Captain G. H. (now Sir Hubert) Wilkins, second in command; T. W. Bagshawe, geologist, and Lieutenant M. C. Lester, R.N.R., navigator. The object was to continue the work of Nordenskjöld's Expedition by mapping the western coastline of the Weddell Sea southwards from Snow Hill Island as far, if possible, as the Filchner Barrier.

Arrangements had been made with Norwegian whalers to land the party at Hope Bay in Antarctic Sound. The ice conditions, however, rendered this impossible and a landing was effected on January 12th, 1921, on the Danco Coast, Western Graham Land. This point was only between 30 and 40 miles beyond the farthest extremity of Nordenskjöld's survey, and for seven weeks the coast was explored in an attempt to find a route possible for men, sledges, stores and eight dogs over the inland plateau to the Weddell Coast. These efforts failed, and at the end of February it was decided that Cope should return to Montevideo and obtain a vessel in which to make the journey, the following spring, to Hope Bay. Wilkins determined to leave the expedition, but Bagshawe and Lester elected to remain behind, to carry out scientific observations and so to preserve the continuity of the expedition.

Leaving Bagshawe in the camp, the other three set out in their lifeboat to find the whalers and inform them of this change of plan. A week later they returned and on March 4th, 1921, Bagshawe and Lester were left as arranged at Water Boat Point, which was the name of their Base in Andvord Bay. The next day they were visited by Captain O. Andersen, of the factory ship *Svend-Foyn I*, who could not persuade them to forgo their determination to remain in the south all the winter, but who promised to come to their rescue, if necessary, the next season.

¹ "Geog. Journ.," LXII, 1923, 174-93.

The two men formed the smallest party that has wintered in the Antarctic. They had no proper hut, but built a shelter of provision cases over an old boat, the latter serving as bedroom and storeroom. The dogs were comfortably housed outside, a store of 30 seals and 200 penguins was accumulated and all outside work was completed before the first winter blizzard. The time was fully occupied. In addition to household duties, meteorological observations were taken every two hours from 8 a.m. to 8 p.m. and for forty days tidal observations were made hourly, day and night. Some surveying was accomplished; geological specimens were collected and a record of ice movements and of bird and animal life was made. Sets of fifty embryos of Gentoo and Ringed penguins were collected. Cope did not charter a vessel, but Captain Andersen arrived on January 13th, 1922, and relieved the explorers.

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